DON DEWEY'S NEW ERA III PLUS THE RCM QUICKIE 200

RCM radio control MODELER

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THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

UNIVERSAL STUDIOS Hindenburg

RCMODELER

FEATURES

VOLUME 12 1975 NUMBER 6

JUNE

THIS MONTH'S COVER This eerie photo was taken on a sound stage at Universal Studios and shows the R/C version of the Hindenburg used during the filming of the forthcoming movie 'Hindenburg,' starring Anne Bancroft and George C. Scott. Inset photo shows the model on outdoor location. Photos by Dick Burkhalter and Dick Tichenor. Exclusive behind-the-scenes RCM story on page 40 of this issue.

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FROM THE SHOP

DON DEWEY

● It's that time again!

Every two years R/C Modeler Magazine runs its Reader Interest Survey, a two page questionnaire which we ask each and every one of our readers to take the time to complete as thoroughly and as thoughtfully as possible. You will find that this form can be folded and either taped or stapled together and dropped in the mailbox with no envelope or postage required. A variety of questions are included on this form in order that we may determine your likes and dislikes insofar as R/C Modeler Magazine is concerned, and your activities insofar as the sport and hobby of radio control is concerned.

Two years ago, when we took the last Reader Interest Survey, almost 20,000 readers of RCM completed the questionnaire and returned it to us. Each and every one of these was thoroughly read, tabulated and cross-referenced from subject to subject, and the results used to determine the material content and format of R/C Modeler Magazine for the next two years. In addition, the summary of these 20,000 forms was provided to each and every member of the industry in order that they might know **your** desires and preferences with regards to the products that **you** want and need so that they might have a guideline for future production.

Now we are asking you to complete this Reader Interest Survey once again. We hope that we will have even more than 20,000 returns. It is an expensive and time consuming job to compile all of the data encompassed in the Reader Interest Survey, but it is far more important than a matter of cost to us to be able to present you with the exact type of publication you want. Thus, we ask your cooperation in taking the time to complete the Reader Interest Survey which you will find in this issue of RCM. Fill it out as completely as possible and use any additional sheets of paper as necessary to list your comments, criticism, and suggestions for improving RCM as you so desire. The final tabulation and analysis of the forms that we receive will determine the type of magazine RCM will be, what material it will present, and how it will be presented for the next two years. Since RCM is **your** publication, written for you, and designed to increase your interest and enjoyment in this sport and hobby, **please** take the time to fill out the 1975 Reader Interest Survey and return it to us as promptly as possible.

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It is with deep regret that the Academy of Model Aeronautics, the non-profit governing body for model aviation, decided to enter into a commercial enterprise — that of producing a commercial model aviation publication in direct competition with the industry from whom it expects support. This rash decision by the AMA has created a furor among all of the members of the model press, a majority of the model aviation industry, and a vast majority of the AMA members with whom we have talked to. It is not so much the specific action, although that in itself is bad enough, but the implication of using membership money to finance a commercial enterprise without general membership approval, that is the real heart of the matter. If this can be accomplished, which is entirely doubtful due to the amount of financing required to produce a commercial publication, then it is a signal of just what a handful of individuals can do with the membership dues of 50,000 plus members and without those members approval.

You will be seeing editorial positions on this drastic and unwarranted action by the Academy and all of the model aviation publications. Our position in this matter was sent to each and every member of the Executive Council in a letter which was also forwarded to every member of the model aviation industry.

We would like to present three unsolicited letters in this month's From The Shop column on this subject which have been selected from many, many letters we have received from AMA members expressing grave concern over this course of action by the Academy. The first is an Open Letter to the Executive Director of the AMA, John Worth, authored by David Meier of Middlesex, New Jersey, AMA #5555:

Dear Mr. Worth,

It is seldom that I write letters of this nature. It is also seldom that events rile me up enough to do so.

The first event was that of a poll being taken to determine interest in a permanent headquarters and nationals site at Hutchinson, Kansas. I was not asked to participate in the poll because I don't subscribe to the Competition News. I am, however, a sometime competitor and president of my club, The West Jersey Radio Flyers. I am also an active Contest Director. Since you didn't ask me, I vote NO until ALL the members of the AMA have been presented with ALL the facts regarding the proposed purchase.

The second event was the rather limited (to say the least) forum provided Academy members to ask questions of the AMA at the special District II meeting at the WRAMS show on March 2, 1975.

Just so you don't think I'm venting my spleen on you and the Executive Council exclusively, I'll pass a salutory 21 Bronx cheer salute at those District II pylon flyers who, at the conclusion of their particular bit of business, rudely got up and left without so much as a wave bye-bye.

Back to the business at hand.

I learned from our new District II V.P., John Byrne at Friday night's cocktail party, that the Executive Council planned to publish an AMA magazine. Correction: not only planned, but had gone right ahead to do it, apparently hiring an editor, one William Winter, who I recall as being at the head of several now defunct publications.

To refresh your memory, sir, I am the one who protested this action at the WRAMS show.

It is now several days later. I've thought it over carefully and discussed it with about 60 AMA members so far. If anything, I now protest even louder.

First, and possibly most important, a government that sets its own editorial policy gets the ability to tell those who are governed pretty much WHAT it wants, WHEN it wants, without all that fuss and bother of presenting dissenting opinions, unless it wants to. The amount of dissenting opinions presented is probably inversely proportional to the amount received.

Second, the competitive atmosphere is rather cloudy.

There are four existing model aircraft publications. Three more, not including yours, are planned. Two model aircraft

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Quarter Midget

QUARTER MIDGET

BY DON DOMBROWSKI AND FRED REESE

● The following letter from Ontario Canada ask some of the most frequently asked questions that we receive.

Dear Fred and Don:

Something I would like to see in your column is information on the small details and methods used when actually flying in a race. For example, where is the best place to stand in relation to pylons two and three? Should the pilot move to this position before he takes off? What is the best way for a caller to estimate the correct time to tell the flyer to get "ready" to turn pylon one? Should the caller push the airplane on take-off? I suppose each flyer develops his own methods, but I would like to know what are considered to be the best methods for flying in a race.

Yours truly,
Floyd Maidment
Forest, Ontario, Canada

Bob, as you said the best methods are usually what is most comfortable for the individual flyer, however we will give our views. Many flyers prefer to be close to number two pylon while flying and some prefer to be near number three, but most seem to choose a spot midway between the two pylons and far enough into the course to fly a constant radius turn around himself for the two pylons as he can initiate the turn using himself as a marker. Most flyers do move to their flying position prior to take-off but they should be sure of a clear view of their airplane during take-off. Often a caller will stand up and obscure the view, possibly causing a mid-ground crash as the pilot does not see the other aircraft. The timing between the pilot and the caller is determined by the roll cycle of the pilot and the airplane. "Get ready" signifies the start of roll and the "turn" command should come just as the airplane is banked 90 degrees. If the "turn" command is early the airplane may fly a longer course than is necessary as he has to wait until his airplane is fully banked before he pulls elevator or he pulls elevator too soon and the airplane makes a climbing turn and loses too much speed. If the "get ready" command is too early the pilot may over-bank with possible disastrous, or erratic, results or he may hold in a knife edge position and the nose may drop causing loss of speed in the resulting pull up.

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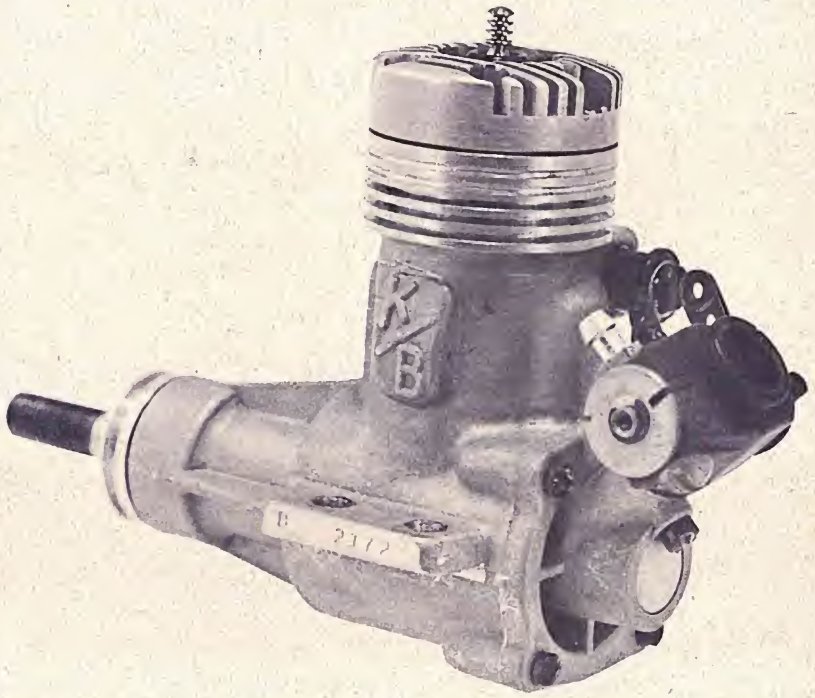
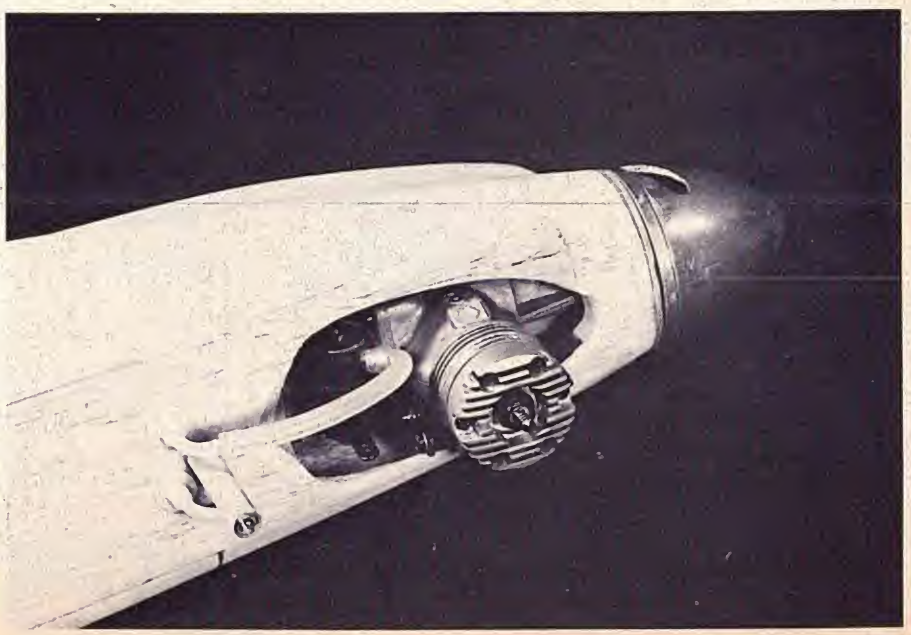


An easy way to get fuel to your K & B .15. Remove the barrel assembly from the carb. Remove fuel nipple and plug with a 4-40 bolt. Drill and tap a new hole on the opposite side and replace nipple. Throttle arm can be rotated 180°, as shown, for easier linkage. This carb mod does not increase performance but simplifies fueling and installation. BELOW: Typical installation of modified Perry carb showing simplified plumbing. A three line fuel system is no longer necessary. RCM photos.



engine clinic

By Clarence Lee

Dear Clarence:

I have an HP61, purchased in 1970, that defies all efforts to make it run through an entire 12 ounce tank of fuel.

The thing that makes it so confounding is that when I first purchased the engine it did run well and was a fantastic engine through the first couple of gallons of fuel – now, in three separate airplanes it will go through half a tank of fuel and then quit as if too lean. It is **not** *being too lean that makes it quit because I have started it off so rich that it barely gets a 5 pound Kaos off the ground – and then quits.*

I have not been too hasty about curing the problem (just replace it with a Webra each time) but it has now become somewhat of a "thing" with me and curiosity, if nothing else, is prompting me to a solution.

For certain, I know that it is not any of the following problems:

1) Fuel – does the same thing with K & B 500, 1000, & Dukes Mixture. 2) Carb. – same with Perry, HP & Kavan. 3) Tank position – I've tried many and with exhaust pressure. 4) Fuel lines – I know I've had the manufacturers working second shifts to meet the supply I've gone through. 5) Head bolts, backplate, or gaskets. 6) Muffler – same results with HP muffler as is, HP muffler gutted, and without muffler. 7) Bearings – replaced them thinking they might be burred. 8) Age or misuse – it has perhaps, a total of 3 gallons of fuel through it, and having been in the hobby for more years than I like to think about, I believe that I've learned how not to treat an engine.

The thing idles well on the ground, revs up well on the ground, and flies well for about five minutes and then plays dead.

Logic says it's too hot, but fact and appearance rule this out.

I've written to Jerry Nelson but have received no reply after six weeks so assume he's too busy at the moment.

Your article "Engine Clinic" is always interesting to me but this appears to involve more than what one encounters in the way of fuel, plugs, etc.

Kindest regards,
Jack Frost
Dallas, Texas

Quite frankly Jack, it sounds to me as though the engine may be over the hill. Although it has only had 3 gallons of fuel run through it, it only takes one or two lean runs or a little dirt to reach this condition. As long as you supply the engine with fuel and the glow plug is good, the engine is going to run providing it is in good condition, i.e. has good compression, both head and crankcase, no binds, etc.

The first thing I would check for is something pinching off the vent tube, such as the hatch block. The Kaos has a removable hatch and, many times, installing the hatch will press down on the top of the fuel tank which, in turn, pushes the top of the tank against the fuel vent tube. As the fuel level lowers, a slight vacuum is created and the fuel can no longer flow. This is usually about halfway through the tank.

How broad is the two cycle range of the engine? Does it break out of a four cycle into a two cycle and still have considerable range or does it break from a four cycle into a two cycle and only have one or two more clicks before dying? A very narrow two cycle range is an indication of a worn out engine with bad compression seal. The engine dies halfway through the tank in the air due to the leaning out tendency as the tank empties. This slight leaning out is greater than the range of the engine and it dies.

If your engine has a broad two cycle range then the next thing to check is fuel draw. Mount the engine on a test stand and try lowering the fuel tank by hand. If lowering it a few inches kills the engine you will know the engine has bad fuel draw — again, an indication of a worn out engine. You should be able to lower and raise the fuel tank five or six inches above or below the needle valve level without the engine dying. Another check for base, or crankcase, pressure is to remove the glow plug and turn the engine over slowly in the direction of rotation that it runs. On the down stoke of the piston a slight build-up of pressure should be felt that releases just after the exhaust port opens due to the opening of the bypass port. The exhaust leads the bypass slightly. If no base pressure is felt you either have a worn out engine or there is a leak in the crankcase. Base pressure and fuel draw run hand-in-hand and, with bad base pressure, you can expect bad fuel draw. If the engine does lack base pressure check the rear cover gasket and also the gasket surface for low spots, gouges, etc. Check both the back cover and crankcase surfaces. If these are okay then pressure is going to be leaking either past the piston or past the crank and out the front bearing. Leakage past the crank and out the bearing is easily detected by noting excess fuel spraying out the bearing. However, an engine has to be blowing fuel quite badly out the front bearing before it will effect the fuel draw badly. Fuel economy will be effected.

That about covers the major checks. I am sure that one or more of these will be the answer to your problem.

Occasionally I get a letter where I am not sure whether it is a put-on or not. We do have a few jokers out there that like to have their jollies. The following could well fit that category but could also well be serious to someone just getting started in the hobby who really does not know. I'll leave off the writers name to avoid any embarrassment.

Dear Clarence,

I have a McCoy .40 R/C mounted on an Ugly Stick. I bought this on a high appraisal from a dealer on Main Street. In my opinion this is the lousiest engine made.

I have had a big problem with it. The first time I had it up, I noticed an ugly blue streak coming from the exhaust. I went down to the

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CUNNINGHAM ON R/C

BY CHUCK CUNNINGHAM

● Okay, sport fans, this month we are going to dig into a question that has been asked over and over again. "What the heck is a CG, how do you find it, and why? And, how do I decide where the CG is going to be on the bird that I am building from scratch." (Did you ever stop to think what a great building material "scratch" is?)

The CG, or Center of Gravity of any aircraft is, for us laymen, basically the balance point of the aircraft. If you have a correctly located CG, the aircraft will fly. If it is improperly located the aircraft will fly badly. If the CG is way off the aircraft won't fly at all, and you will be picking up sticks very quickly if you try to fly with a misplaced CG.

On full size cargo aircraft, a very precise method is followed to insure that the airplane is properly loaded, and that the pilot is not surprised on take-off to find that the aircraft's tail won't get off of the ground. We should take just as much care with our type of aircraft to see that it is properly loaded.

First, let's take the example of locating the balance point of a 12" ruler. If you extend one finger (you pick the one) and place the ruler crosswise on your extended digit you will very quickly know if it is in balance or not because it will slip off of your finger and bounce off the ground if you haven't tried to balance it at its own Center of Gravity. Naturally, you will find that the ruler will balance around the 6" mark, or one half of its length hanging over on each side of your finger. Now, if the wing and horizontal stab were of the same size, and were equally located fore and aft of the mid-point of the fuselage then, perhaps, this could be the CG of this type of aircraft, but this is not the spot for our purpose.

Some years ago, just after World War II the popular type of free flight aircraft of the day came to be known as "Pencil Bombers," or "PB". These models had the wing mounted on a pylon, much as today's competition free flight model does, although the pylon was usually much higher than is used today. The engine was mounted very close to the leading edge of the wing and, in some designs, the engine was mounted under the leading edge of the wing, with just the prop clearing the wing LE. The fuselage, aft of the wing, was very long and slender, and the horizontal stabilizer was mounted way to the rear. This stabilizer had a lifting airfoil as did the wing. Often times a true PB had the area of the horizontal stab equal to half of the area of the wing, and the CG was located right at the trailing edge of the wing. The glide of this type of aircraft was very slow, and they were usually trimmed to fly just on the verge of a stall.

Later, when radio controlled models began to appear on the scene, they resembled the earlier cabin type Free Flight aircraft, but they did tend to maintain a rather short nose, a medium length tail, and a lifting airfoil in the horizontal stab. Balance points were kicked around a bit, but the generally accepted practice came to be to balance the aircraft at a point about forty percent back from the leading edge. As a lot of you now reading this column do not know, these early aircraft were controlled by only the rudder. No other controls were used and controlled flying was done by interrupting the normally gentle flight path of this type of aircraft. The designs were set up so that, after the rudder interrupted the flight, the aircraft again came to a stable flying condition.

Actually, those of you who have never experienced the fun of flying rudder only aircraft have really missed out on some fun. The only way that any stunts could be done was with the rudder. If you held rudder long enough the aircraft would heel over into a spiral dive. When you let off of the rudder the natural ability of the aircraft would take over and it would right itself and, due to the terrific speed build-up, the nose would come up and the airplane would zoom.

If you were good, you could get a loop out of the zoom, and if you were quick, you could snap in rudder at a critical point in the zoom and get in a couple of three quick rolls. Early rigs had no method of controlling the throttle — in fact, engines were not equipped with throttles, so you flew until your aircraft ran out of fuel, and then you set up and made a dead stick landing. To this day, you can recognize the early rudder-only fliers because they can always get a dead stick aircraft back to the field for a good landing.

But, this is getting a bit away from the subject. When multi channel reed sets appeared on the horizon the balance point was still held at about forty percent. Then, suddenly, it magically moved forward to come to rest between twenty-five and thirty-five percent. This was brought about by the use of symmetrical type airfoils, and flat stabilizers. A lot of models were turned to dust when the fliers tried to slow them down on landing. With a symmetrical wing, a non-lifting tail section, and a tail heavy condition existing, it made the dying duck snap roll into the ground — a very popular and common maneuver.

And, a lot of pilots never knew how or why their airplanes smote the ground. Some looked around for someone else on their frequency, others claimed radio failure, and so on, when all of the time the real problem was that the balance point was just too far to the rear. I really think that the advent of Formula I racers may have signaled the start

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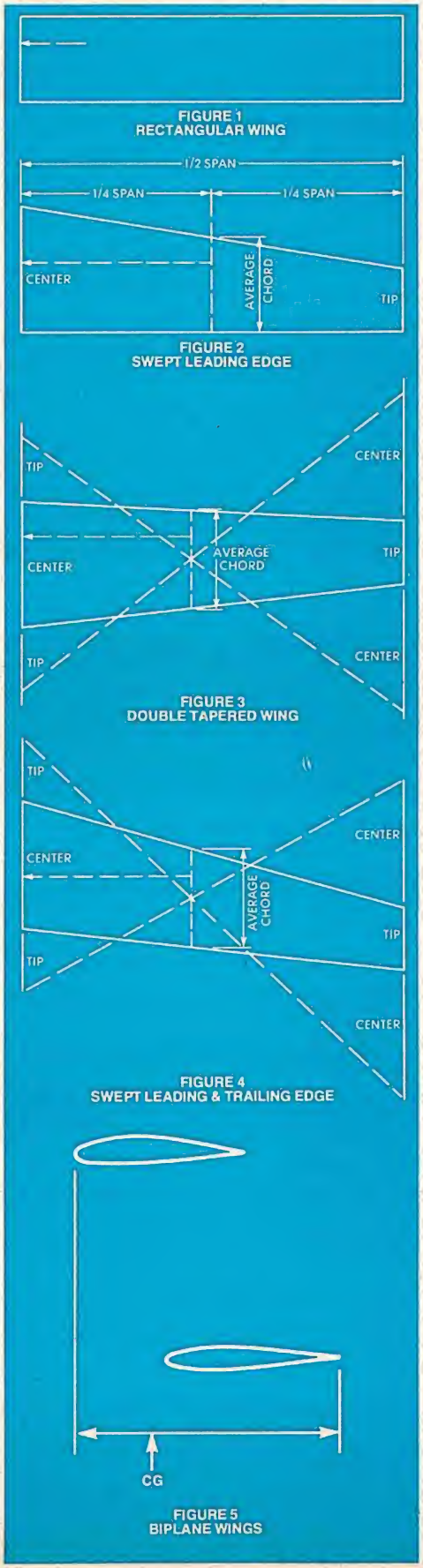


FIGURE 1
RECTANGULAR WING

FIGURE 2
SWEPT LEADING EDGE

FIGURE 3
DOUBLE TAPERED WING

FIGURE 4
SWEPT LEADING & TRAILING EDGE

FIGURE 5
BIPLANE WINGS

CYANOACRYLATES AND RC . . . A GIANT STEP FORWARD

BY DON DEWEY

● ZAP Adhesive is a super bonding agent new on hobby dealer's shelves. In this world of magnificent adjectives, "super" is over-used, has a certain triteness, and has about as much pazazz and impact in our blase society as "deluxe" emblazoned on the trunk lid of a '37 Chevie. But "super" in Webster's thinking denotes something that is "over and above: higher in quantity, quality or degree than" a comparative item. And Mr. Webster tells it as it is . . . ZAP Adhesive is a "super" bonding agent.

Available to the hobby industry through Soarcraft Products of Saratoga, California, ZAP can be described formally as an advanced, fast-setting, room temperature curing cyanoacrylate adhesive. It is economical, it is simple to use, and it bonds rapidly — from 2 to 30 seconds depending upon materials being bonded. Typical model aircraft balsa wood joints are secure in about 10 seconds or less. ZAP is a single-component (no measuring or mixing) solvent-free adhesive which cures under normal room conditions.

This new adhesive represents a real breakthrough in pricing that is especially meaningful in today's economy. Two sizes are available, 1/4 and 1/2 ounce, and each provides a "cost per" factor that is significantly lower than any similar product. In addition, Soarcraft's package includes ZAP-Filler — minute, hollow, fiberglass spheres, with each bottle of ZAP Adhesive.

As with any of the low viscosity, space technology adhesives, ZAP will not bridge voids such as occur in poorly fitted joints. It is not designed to do so. With ZAP, the tighter the joint, the thinner the bond line, the stronger the bond, and the more rapid the polymerization (curing). But ZAP-Filler helps ZAP Adhesive work under less than perfect conditions. The Filler can be applied to a joint with a small, watercolor brush (dry, of course), balsa stick, toothpick or such as might be handy. Excess ZAP-Filler should be brushed away from the joint, and a single drop of ZAP Adhesive added. The ZAP and ZAP-Filler cure as a solid, bridging the void and creating a perfect, extremely strong joint.

Of special interest to those yet to try a truly modern adhesive — and we predict that the term "ZAP" will soon be commonly used in the hobby vernacular as a verb as well as a noun — is Soarcraft's 1/4 ounce bottle which retails at only $3.45. This value package will allow painless introduction at better than competitive "cost per" prices, and the 1/2 ounce bottle is a real buy.

Cyanoacrylate adhesives are produced for industrial applications, and are normally packaged in volume quantities that are completely unrealistic for individual needs. Even the most prolific builder could hardly justify a 250 year supply of adhesive at an outlay of several thousand dollars that required refrigeration for extended shelf life.

In order to provide the hobbiest with usable quantities at reasonable prices, Soarcraft's ZAP is packaged by an automated system within a controlled environment. It is characteristic of cyanoacrylates that shelf life and thus usability, are environment critical. Anything other than optimum conditions during packaging can cause rapid deterioration of shelf life and slower speed of cure. ZAP Adhesive shows a realistic life of six to nine months, and this can be extended by refrigeration.

ZAP users will invent ZAP uses. At RCM, we have found this to be fact. For example, ZAP Adhesive makes a perfect, instant, and absolutely clean bond for control surface hinges. One of the more troublesome, small tasks is reduced to a study in simplicity: slit the appropriate surface edges, slide hinge into position, and ZAP! No clean-up, no unwanted fillet, no pins — just ZAP it and it's ready.

We also discovered that ZAP applied to a soft balsa surface penetrates through the wood, and provides a continuity to texture that allows drilling a clean, accurate hole. Amazing.

The fact that pins, clamps, clothespins and other types of assembly tools and building fixtures may soon be near extinction makes for interesting conjecture. ZAP Adhesive can be used to "tack" troublesome components in position while larger or more complex elements are being assembled. ZAP makes fingers practical as an assembly tool — though care must be taken to avoid building in the human subsystem! ZAP bonds skin to almost any material. Immediately!

The normal preparation for assembly notes are included in Soarcraft's instructions. Mating surfaces should be clean, dry and free of any oil or grease. Also, pitch or tar as found on denser woods such as pine, spruce or plywood should be sanded lightly in bond area prior to ZAPPING. A few cautions are also noted, but these pretty well resolve to common sense practices.

In addition to ZAP Adhesive satisfying Webster's several requirements of "over and aboveness," greater quantity and quality to be categorized as a truly super product, ZAP has got to be an advertising executive's dream product. Now it may never replace Monopoly or Scrabble, but creation of ZAP slogans could become at least a minor pastime on the national scene. A few of the staff's favorites are: "ZAP . . . and go," "hold it . . . ZAP it . . . sand it," and "ZAP makes field repairs a matter of finding the pieces."

The mighty tough little drop of ZAP which feeds through the 1/32" teflon tube in the top of the bottle may very well have more impact on the advancement of model construction techniques than would twice the pre-fabrication now common. With ZAP Adhesive, building resolves to finding the parts and setting 'em up, because bonding occurs almost the instant each joint is ZAPPED. 100% bond strength occurs within an hour or two, but for all intents and purposes, a few seconds provides a fantastic bond strength. That ZAP can cut model building time by 50 to 75 percent may be an accurate estimate. Fit the parts together — ZAP — and the assembly is ready to sand and cover! □

RADIO SPECTRUM

BY JIM ODDINO

● Did you ever have a bad day at work and take a look at the beautiful weather and say to yourself, "I'd rather be flying"? I'm sure it's happened at least one time in your life and that many of you would have, and could have, gone except that you hadn't charged you batteries the night before.

Or, did you ever start to pack your equipment in the car to take off for a full days flying, (you had been planning it for a week) only to discover you'd left the switches on after testing the night before?

Did you ever go to a contest and stay at a hotel where it was a half mile and ten floors from the parking lot to your room and you had to carry your airplane, transmitter, tool box, etc. through the lobby?

Or perhaps you've stayed at the contest site in your camper without any AC available?

These might not be the exact questions but I think everyone can think of a circumstance when he would have liked to have had a means of charging his batteries fast and/or from a 12 volt source. Well I think I've got the answer to those problems in the form of a fast field charger.

You've probably seen "fast" chargers advertised by some of the radio manufacturers in the past, but these should be called "quick" chargers to agree with the nomenclature used by the cell manufacturers. According to GE, "quick charging" covers the range over C/10 to C/^{2} and the term "fast charge" is used for rates over C. We're going to be talking about rates up to 10C so we're definitely in the "fast" range.

I know this is going to be hard for many of you to accept but it is not only possible but very practical to charge your transmitter and airborne battery packs in as little as 15 minutes from your 12v car battery or from your 12v starter battery. In case you don't believe me let's take a look and see what General Electric says in their Application Engineering Handbook. (Required reading for the serious R/C modeler.)

"Among the most significant features of General Electric nickel cadmium batteries which lead to their choice as the preferred power source are the following." . . . *"high rate charge acceptance"* . . . *"high charge rates allow the user to recharge in very short periods of time, in some cases in as little as two or three minutes. This fast recharge capability allows the use of smaller, lighter weight, and less costly batteries."*

Gould uses almost the same words, but throws in the added caution: "Nickel cadmium cells can safely accommodate high charge rates, but the current must be reduced or terminated before excessive pressures are generated if the charge is continued into the overcharge mode."

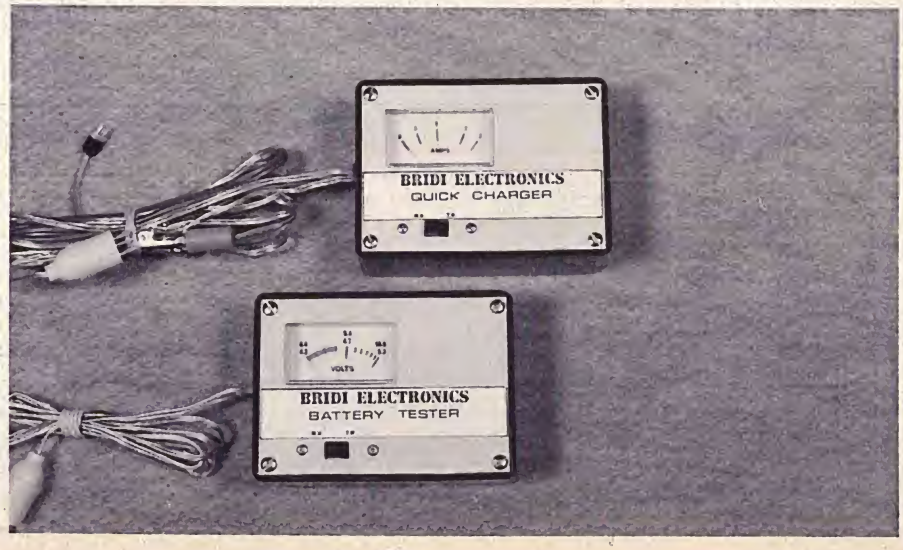
This has been the big bugaboo in the past. How do you detect when you are going into overcharge so you can turn off the charger? The answer has always been it is too expensive to mechanize, so let's just tell the customer to charge at C/10 or C/3, so if he forgets to take it off the charger he won't destroy the battery.

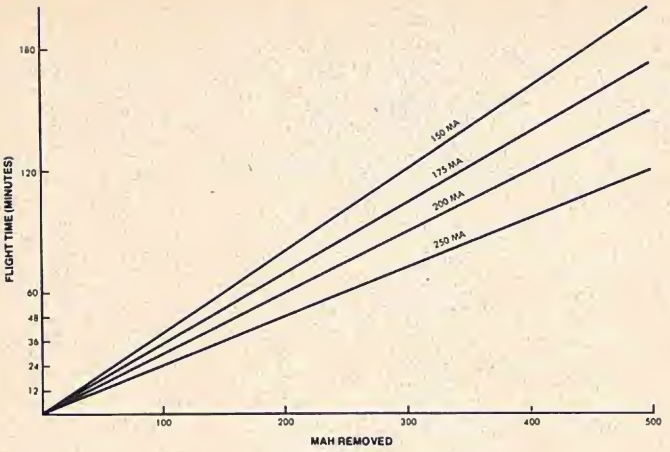
Here comes another statement you won't believe. Your battery will **last longer**, meaning you will get **more** charge cycles, **more** flights, **more** years or whatever it is you count if you properly use the fast charging technique I'm going to describe, rather than use the conventional C/10 or C/3 charger supplied with your R/C system. The reason is you will not be discharging your batteries as low as you would if you didn't have the fast charger and you will **never be over-charging** the battery.

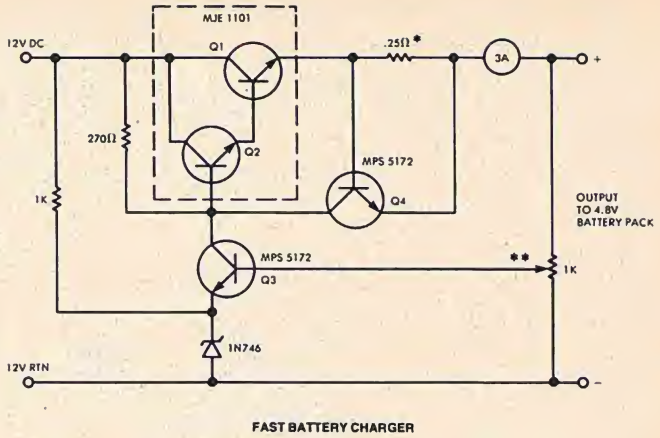
I'm going to have to back up that statement, so here is a quote from the Gould Battery Handbook.

"When a cell is operated in a cyclic regime, the depth of discharge greatly affects the cycle life. The general rule is that

FIGURE 3: The Bridi Electronics Fast Charger and Battery Tester.







FAST BATTERY CHARGER

* ADJUST UNTIL CURRENT IS 2.5 AMPS WITH THE OUTPUT SHORTED.

** ADJUST FOR 6.0 VOLTS AT THE BATTERY CONNECTOR WITH A .5 AMP LOAD. (12 OHM RESISTOR)

FIGURE 2

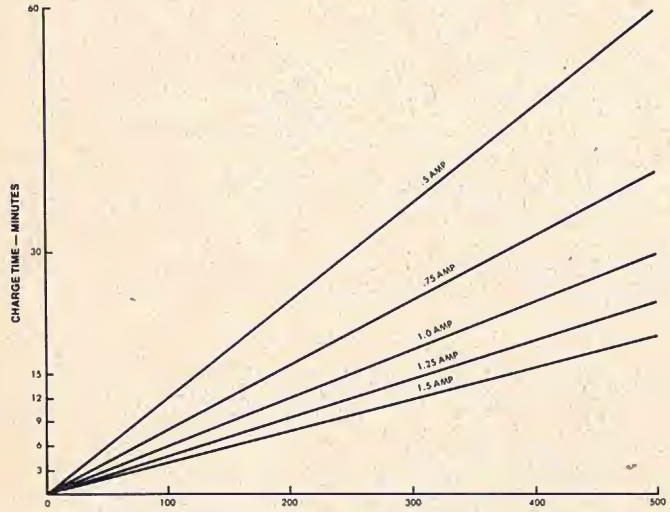


FIGURE 1

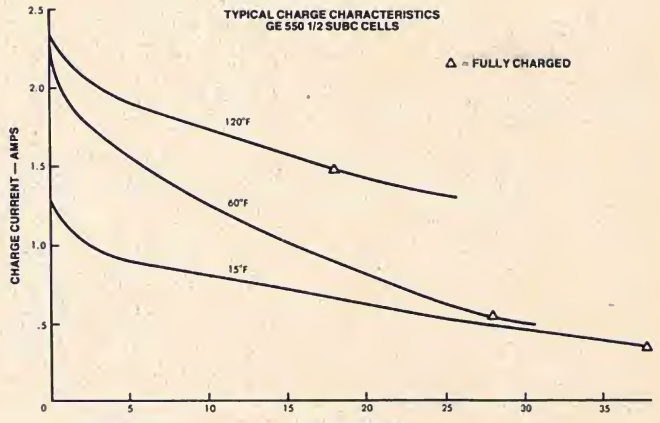


FIGURE 4

the shallower the discharge, the greater number of cycles obtainable before irreversible failure. Temperature is also an important factor. Cells cycled at 75°F will have a cycle life expectancy much greater than those cycled at 115°F."

When you leave your C/10 or C/3 charger on overnight you are almost always driving the batteries into overcharge where most of the current generates oxygen which produces heat when it reacts with cadmium.

GE says: *"Battery temperature is the most significant parameter in the life expectancy of a nickel cadmium battery. Battery temperature, . . . is the sum of the ambient temperature in the immediate proximity of the battery, and the internal temperature rise. . . . Temperatures above room ambient accelerate reversible and non-reversible performance degradation."*

"The depth of discharge has a definite impact on the life of nickel cadmium batteries. Whenever the depth of discharge is very deep, some cells will approach zero state of charge. In a sealed cell, the probability of an internal short is much greater during low or zero state of charge than during states of partial or full charge."

Some of you may have experienced this when you accidentally left your switches on and ran your batteries down. When you went to charge them, one or more cells wouldn't take a charge. Many times these internal shorts can be vaporized by charging with the fast charger, and your pack can be used again without worrying about shorts, unless you let it run down again.

If you're not gung-ho about fast charging after all of these desirable features, go read something else, but save this article, because eventually there will be more people fast charging than those who are not and you will want to get in on the action.

So our routine is going to be something like this. Never try to get the last few flights out of the pack. When you get down to the last 30%, recharge. Never try to get the last 10 to 20% into the battery during charge. Your plane will fly just as well on a battery that is 80% charged, and it wastes time trying to get the last 20%. **Do not** discharge your batteries after every flying session, but more like once a month, and then recharge with your C/10 or C/3 charger, preferably C/10, in order to restore a balance between cells and to get rid of any so-called memory effects. We'll have more to say about "memory" in a future issue.

We already told you how to determine when you were down to the last 30% in the April issue which also told you how to cycle your battery. Now our problem is to tell you how to fast charge it and turn it off before it goes into overcharge. Before we do, let's see if there are any other constraints.

There is obviously some upper limit on the charge current in order that the I^2R heating effect doesn't damage the cell's gaskets and seals. This is at a charge rate over 20C. For this and meter scaling reasons we will discuss later, it was decided to limit the current to 2.5 amps which is 5C for 500ma-hr cells and 10C for 250ma-hr cells.

The third limiting factor is the cell voltage during charge. I have never seen it in writing but I have been told by engineers at Gulton that you should not exceed 1.55 volts per cell during charging, especially at low temperature where hydrogen can be generated during overcharge. (Your C/10 charger does not protect against this and should not be used below 41°F). This may only be a problem during overcharge but I decided to play it safe and limit the voltage to 1.5v per cell or 6 volts for a four cell airborne pack.

So there we have it. The last two requirements are easy and, in fact, can be set-up on a standard laboratory power supply that has voltage regulation and current limiting. That's what I used for my original experiments. I set the voltage to 6 volts and I started with the current limited to 4 amps but noticed that on good batteries the current dropped to less than 2.5 in a matter of seconds, so I decided to limit the maximum current at 2.5 amps.

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SUNDAY FLIER

BY KEN WILLARD

Dumb, dumb, DUMB!

Here's what happened **this** time. I get one of Bill Cannon's new lightweight Tini-Twins (told you last month how well it performs for me) and after making all sorts of long range tests with it, I'm satisfied. So, since it is a lightweight job, I take it out of the sailplane, and put it in my Showmaster, which I was still flying around in my front yard (notice I said **was**?). Installation is a breeze - just the combo receiver and two servo units mounted to the bottom of the fuselage with servo tape, and the 225 pack just in front. Took about ten minutes.

Since I had been flying the unit in the sailplane, it was time to recharge the batteries, so I plugged the batteries into the charger, made **sure** the switch was on so charging would occur (the Cannon unit charges the batteries through the switch) and plugged the charger into the wall socket, which I **knew** was alive because a table lamp was lighted by the connection to the other socket in the same unit. Great. Went to bed, slept like a log. Must have — was really loggy when I got up. Anyway, it was a nice, quiet Sunday morning, no wind, sun shining. I knew the Pioneers' field would be really crowded, so, rather than driving over there (boy, am I glad I didn't) and waiting a turn, what would be more pleasurable than just firing up the Cox QZ — it doesn't disturb anybody — and putting in a couple of flights in the front yard? Let's do it.

After pulling the battery charger from the wall socket I disconnected the batteries from it and put them back into the receiver circuit. The receiver twitched slightly, indicating the switch had been properly turned on for charging, and, after briefly turning the transmitter on and checking the controls, I switched both off, fueled up the QZ, connected the booster battery, fired up the engine, and was ready to fly. Turned on the receiver, the transmitter, operated the controls, and launched the Showmaster for the first flight of the day — and the last flight of the Showmaster!

It was fun at first, looping and rolling around above the street. But after about a minute or so, the plane went into disaster mode — right rudder and down elevator. Splat on the asphalt. Wotinell happened? Everything had been working so perfectly, like I told you. No, the servo mounting tape still held the receiver unit to the bottom of the fuselage — even through the crash. Interference? Maybe — but it wasn't. After picking up the pieces and slinking back into the garage, hoping none of the neighbors saw me, I started the post mortem. It didn't take long.

First, of course, check the radio to see if it still worked. It did — at first — but after about twenty seconds it went into disaster mode again — right rudder and down elevator. Yep — dead batteries! How could that be? Freshly charged, and I knew everything was done right. Also, I'd used the charger before, in the sailplane testing bit, so that couldn't be it. Well, let's check it anyway. So, with the switch turned on properly and everything connected I plugged in the charger, then went back to some other work for about an hour. This time, when I came back to unplug the charger, I noted that it was still approximately room temperature. Ahah! That was it. The charger wasn't working, and when I first got up and unplugged it I just didn't notice that it wasn't warm, like it should be after it has been working for awhile. And now the rude awakening. I unplugged the charger, then casually ran my fingers down the cord to unplug it from switch. What's this? It isn't connected? But I just connected it! A quick check showed why. There **was** a line connected, but it was attched to another charger! Dumb, dumb, dumb! If you don't have two chargers, that couldn't happen. Incidentally, if the charger had had a light in the circuit to indicate it was on, it wouldn't have happened either.

But it did happen, and I felt pretty stupid. Like I did a little earlier while testing the Cannon unit. I have an old, beat up sailplane that just doesn't seem to want to crash badly enough to be beyond repair, and whenever I get a new unit I stick it in this old job just in case. The Cannon unit was easy to fit, the pushrods connected without modification, and I took the plane up to a local field for a quick test. Put the wind on, check that the controls responded, and hand launched for a test flight. It was a little nosedown in trim so I pulled up elevator, and the model dived into the ground! Yup. Had the elevator pushrod connected to the wrong side of the servo arm.

Wouldn't you think that, after all these years of flying R/C, things like that wouldn't happen? But they do. Why? Well, the reason is simple. First, there's an element of carelessness; I know you should have a checklist, and go through it for everything you do. But I don't, in most cases. At the moment I have three checklists, which I do go through (most of the time, anyway) before leaving the house to go flying. One list is for the times I'm going thermalling, the second for when I'm going slope soaring, and the third is for when I'm going to go flying a seaplane.

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RCM QUICKIE 200

RCM introduces a whole new concept in Half-A Racing . . . the Quickie 200, a racer with the proper dimensions for stability and penetration. Fast, economical with smooth take-offs and grease-on landings. *BY RONALD SHEAN.*

Editor's Preface: When the Quickie 200 was first submitted to us to consider for publication by its author, Ronald P. Shean of Paramount, California, a member of the BIRD'S Club, we were impressed with the simplicity of construction as well as the comments we had heard concerning this ship from local pylon fliers. For this reason, we decided to build the RCM prototype shown in the photographs accompanying this article. This prototype was extensively tested by both Dick Kidd and myself, using a stock Cox TD .051 engine, a Kirn-Kraft pressurized .051 with bored out venturi and special needle valve, and a non-pressurized Kirn-Kraft Cox TD .049 with Cox muffler. During these test flights, we became more and more impressed with the performance capabilities of this little ship that took only two evenings to construct. All test flights were performed with an RS Systems radio using two servos and a 225 mah battery pack. Standard Cox "red-can" fuel was used for all test flights. During the testing period, we loaned the aircraft to RCM staffer, Bill O'Brien, who took it to various fields and put it through its paces for local fliers - all of whom were as impressed as we were with its capabilities as a racing aircraft and with its high performance stunt potential. Following this, we got together with RCM's racing editors, Don Dombrowski and Fred Reese, and they, in turn, put the Quickie 200 through its paces. During these flights, too numerous to even count, we shifted the C.G. position several times, increased and decreased aileron and elevator throws, and checked the ship for handling characteristics every time a change was made. As originally presented to us, the C.G. was further forward than is shown on the plans accompanying this article. This, in turn, necessitated a greater degree of elevator throw which did not enable the aircraft to groove as well as the more rearward C.G. position shown on the plan coupled with the resultant decrease in elevator throw. Fred Reese demonstrated this quite capably by flying the aircraft for almost an entire tank full of fuel no higher than approximately five feet off the ground. Yet, for those who are not interested in racing, this ship is capable of axial rolls both horizontal and vertical, vertical eights, inverted flight, inside and outside loops, and just about anything else you'd care to perform. Its speed is in the 65 mph range and ranks with the best 1/2A midgets in the field. Yet, it grooves like its larger pattern and racing counterparts, with absolutely no bad characteristics. It is extremely easy to land and take-off, and can stand a great deal more abuse than its larger and heavier cousins. Our prototype was built entirely with Hot Stuff, covered with yellow Solarfilm and trimmed with MonoKote trim sheets and DJ's Striping Tape. The ailerons and elevators were connected with Solarfilm hinges with the edges sealed with a thin coating of K & B clear Superpoxy. Following the test flights that went on for a period of several months, Don Dombrowski and Fred Reese drew up the set of rules for the RCM Quickie 200 races which you will find in this issue of RCM. We predict that this will be one of the most popular club racers throughout the country, and one which will add a great deal of enjoyment as a club racing activity. It is easy and quick to build, inexpensive, and uses components that are readily available throughout the country. Its performance equals or surpasses almost any of its counterparts available today. Even if you are not interested in racing, you'll find the RCM Quickie 200 an exciting high performance stunt ship — and we'll bet that you'll soon be entering the next Quickie 200 race in your area! - - - Don Dewey

Have you ever given 1/2A Pylon Racing a try? Did you give up on it because the little tiger was too wild to control, refused to track, was impossible to take-off, and most landings were really a controlled crash?

Or, perhaps, did you discover that with certain areas of the country, 1/2A Pylon Racing was going the route of Formula I with reworked, hopped-up engines, 60% nitro fuel, super special props, and all the other speed merchant gimmicks that took racing out of the reach of the average flier?

According to the 1/2A Pylon Racing rules, the planes must "look like" a full size plane that has raced or was built to race. The wing must be 7/8" thick, have a constant chord and no taper. The major drawback to these rules is that the short fuselage required to achieve the "look like" feature is largely responsible for the poor tracking these racers so often exhibit, not to mention the fact that most of them have to be hand-launched.

The solution is a simple, light, strong, boxy, lean racer with dimensions which will ensure good flying qualities — a club racer similar to the Quickie 500, Toad, or RCM 15-500. In other words, the RCM Quickie 200!

The Quickie 200 is not a scaled down Quickie 500 but is a lean "look like" 1/2A Racer with dimensions set for flying **right**. It is fast, cheap to build and fly, safe to race, quick building, and almost indestructable. Stability and penetration are excellent, take-off is quick and easy, and grease-on landings a sight to see. When powered by a Cox Babe Bee or Golden Bee, the RCM Quickie 200 is quite docile and becomes a great low wing trainer.

For racing, however, the only competition engine available now is the Cox TD .049-.051 which makes all the racers about even — on the ground. In the air you can race on equal terms with the hot shots! As a club racer, and with the RCM Quickie 200 rules presented in this issue of RCM, this little ship has a lot going for it. It flies the pylons with all the zip and thrills of its big brothers but at a lower cost and safer speeds.

FUSELAGE

Cut the fuselage parts from 3/32" medium sheet balsa including all tail surfaces. Cut out the plywood formers and the 1/32" plywood doublers. If you prefer, 1/16" balsa sheet applied with epoxy cross-grained to the fuselage sides is a good substitute for the 1/32" plywood. Install the Tatone or Kraft .049 engine mount on the firewall. If you have a Tatone mount with only two holes, drill a third mounting hole in the bottom of the mount for extra rigidity.

Attach the landing gear to bulkhead F-2 before assembly. If using a bolt-on wing, drill a 1/8" hole in bulkhead F-2 for the wing dowel. Sand, dust, and cover the tail surfaces with Solarfilm or any one of the iron-on films of your choice. The control surfaces can be sewed on using 1/2A control line or heavy carpet thread, dabbing each stitch with dope to anchor the thread. Sewn hinges are easy, durable, and do not leave a high drag hinge gap. Use a fairly small needle and, for those who cannot thread a needle, there is an eyeless needle available! For extra strength, smear dope or glue over the proposed hinge area of the tail surface before covering. If you prefer, Solarfilm or MonoKote hinges can also be used.

The 2 oz. Sullivan Slant Tank fits perfectly into the hatch with ample space left for stuffing a foam wrapped 225 mah battery behind it.

WING

Follow the instructions included with the Ace constant chord wings. Ailerons will work very well with the dihedral called out for in the Ace foam wing instruction sheet. If you take out the dihedral, the ship will roll better but is slightly less stable. I would recommend using 1/2" dihedral under each tip. Aileron and elevator surface deflections should be as shown on the plans. Be sure to cover the ailerons before sewing on, or otherwise installing, your hinges.

All servos can be installed with Rocket City servo tape. Coat the wood surfaces with epoxy and let dry before applying servo tape. Apply monofilament tape or strong cloth tape to the bottom of the wing as per the Ace foam wing instructions before covering the wing with Solarfilm. A 7" spar of 1/16" plywood was epoxied into a worn out and badly dented wing and preserved the life of the wing for many more hours.

FLYING

Balance the wing and check the entire aircraft for the proper C.G. as shown on the plans. Use a fuel of at least 20% nitro and set the engine for high rpm's but keep it as rich as possible. A Cox 5½/4 prop is a good size for the first flight. Release the ship into the wind and you will find that it will ROG in about 30 feet in a wings level climb. After trimming it out, try a loop, roll, Immelman, Split S, outside loop or what have you. The RCM Quickie 200 is surprisingly agile and has good penetration even in fairly high winds. And, for 1/2A Club Racing, its stability around the pylons at 15 feet altitude makes it a fun racer for even the first year RC'er. The 2 ounce tank gives a flight time of approximately 8 minutes.

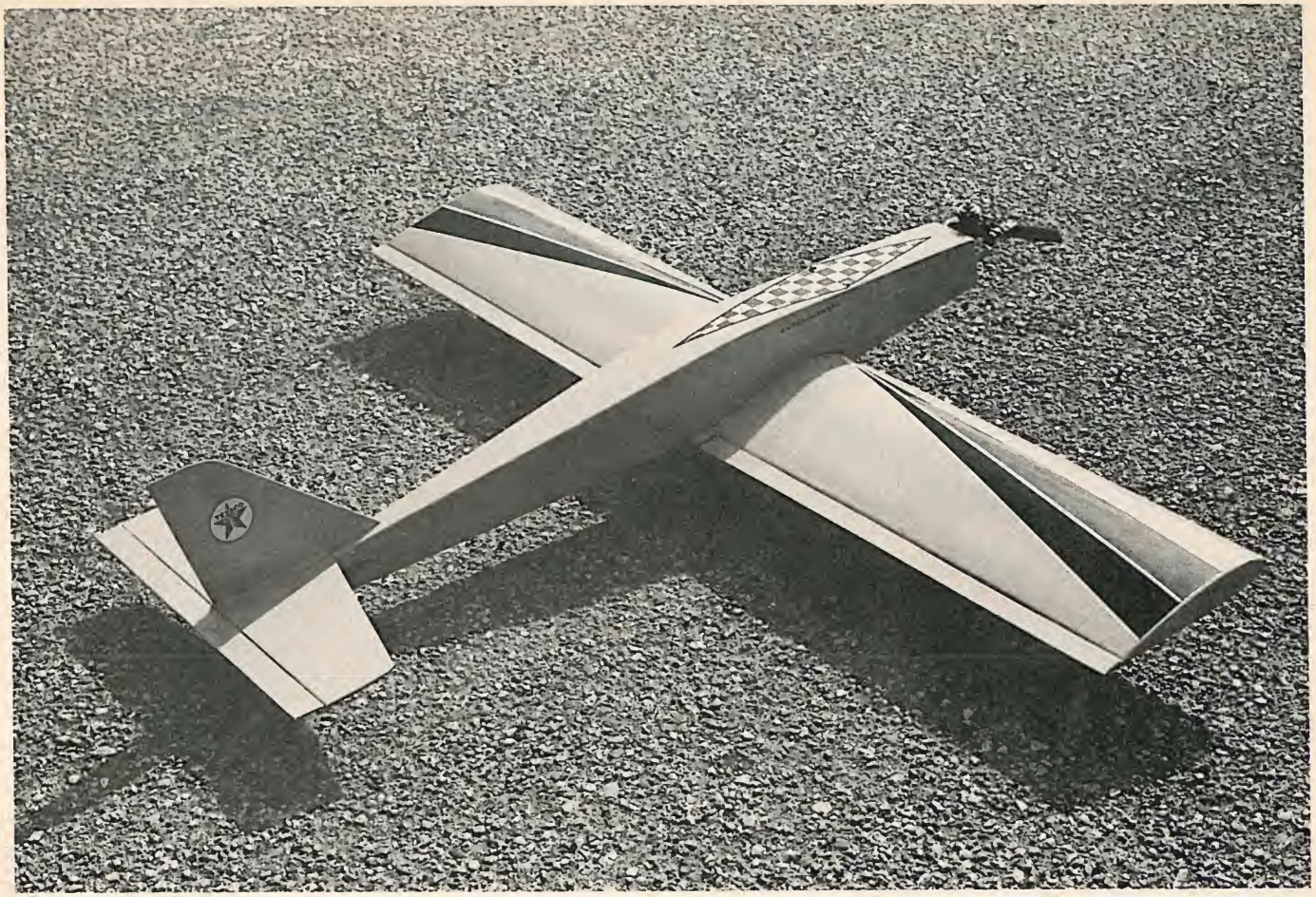
Try the RCM Quickie 200 and you're going to find out that good things come in small packages. It may just change your entire attitude about the performance potential of small aircraft. □

QUICKIE 200

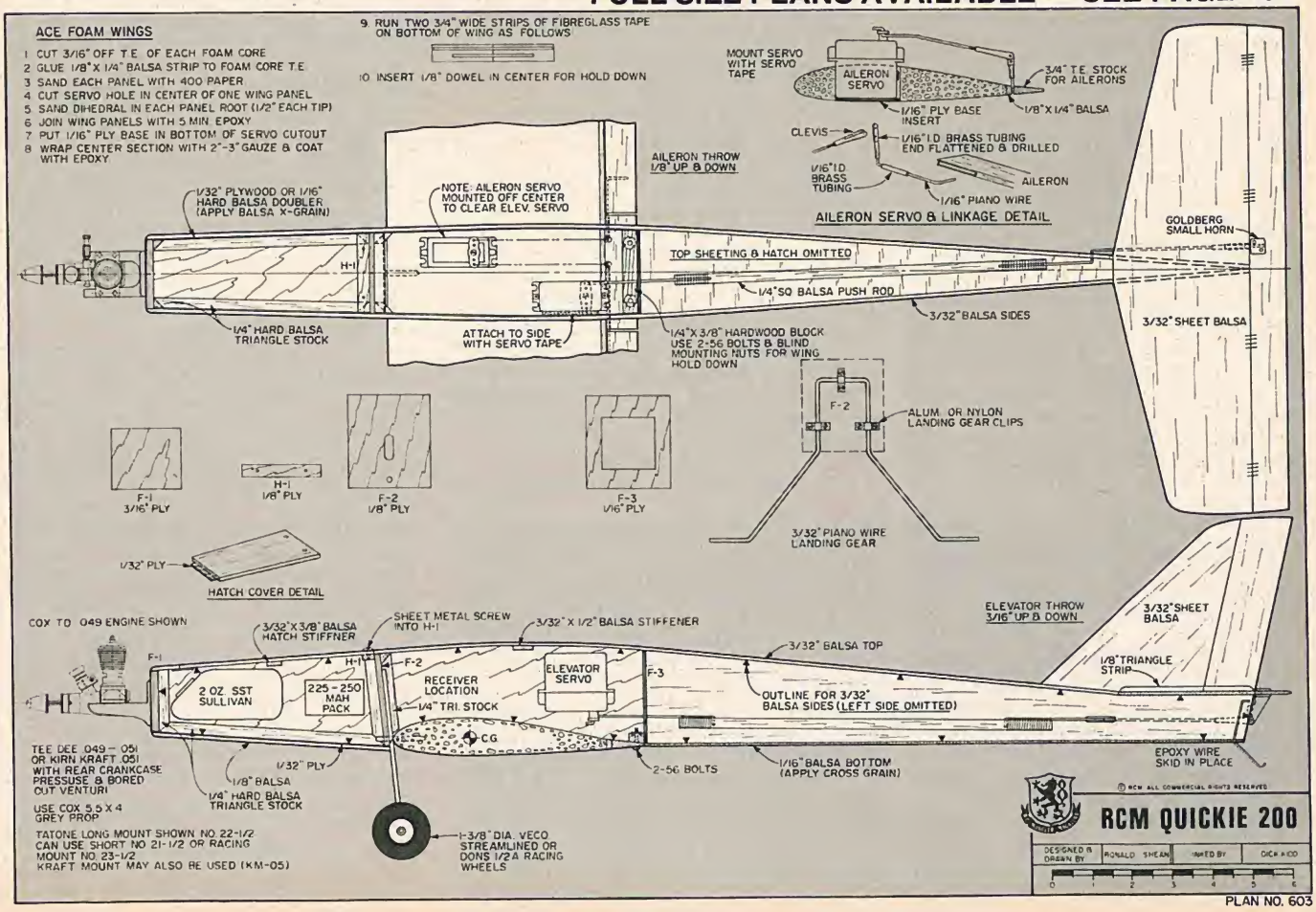
Designed By: Ronald Shean

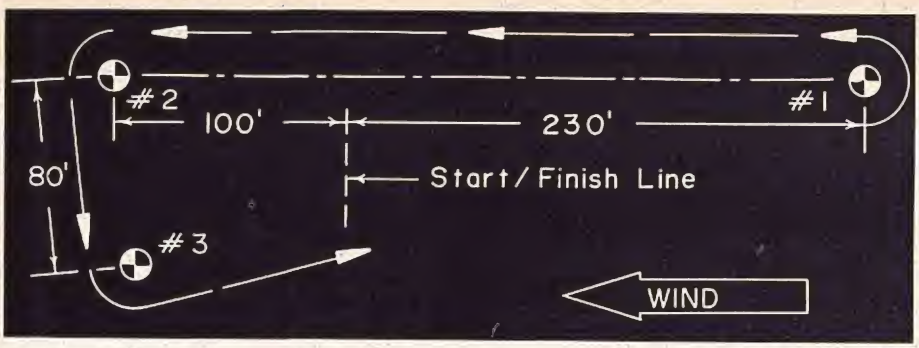
TYPE AIRCRAFT
1/2A Club Racer
WINGSPAN
35 Inches
WING CHORD
6⅛ Inches
TOTAL WING AREA
214 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Semi-Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1/2 Inch
O.A. FUSELAGE LENGTH
27 Inches
RADIO COMPARTMENT AREA
(L) 6¼" X (W) 2" X (H) 1¾"
STABILIZER SPAN
12 Inches
STABILIZER CHORD (incl. elev.)
3¾ Inches (Average)
STABILIZER AREA
45 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
4¼ Inches
VERTICAL FIN WIDTH (incl. rudder)
3½ Inches (Average)
REC. ENGINE SIZE
.049-.051 Cubic Inch
FUEL TANK SIZE
2 Ounce Sullivan
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Elevator and Ailerons
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, and Ply
Wing	Ace Mini-Foam Constant Wing #13L192
Empennage	Balsa
Weight Ready-To-Fly	23 Ounces
Wing Loading	15.43 Oz./Sq. Ft.



FULL SIZE PLANS AVAILABLE — SEE PAGE 151





R C MODELER MAGAZINE'S

QUICKIE 200 RACES

By Don Dombrowski & Fred Reese

For years now RCM has proposed successful new racing classes. The rules presented in this magazine are the basis for current Formula I, Quarter Midget, Quickie 500 and 1/2A Pylon rules being used all over the country. With the current upsurge of interest in 1/2A and Quickie 500 racing, we are presenting a new, up to date set of rules for 1/2A racing that uses a simplified scoring and easy guidelines for club racing. Quickie 200's are miniature Quickie 500's with 200 square inches of wing area, powered by .049 or .051 engines. We have flown one of the RCM prototypes and found it to be a great little airplane that was quite fast yet very easy to fly. Don Dewey said he only spent two evenings building the little racer.

1. OBJECTIVE

To provide closed course racing for the sport flyer and novice racing enthusiast.

2. GENERAL

All AMA and FCC regulations covering the R/C flyer, his aircraft, and equipment, shall be applicable to this event except as noted herein. There shall be no limitation on the type of radio equipment fitted to the aircraft with the exception that only two control surfaces shall be actuated, i.e. elevator and ailerons. Each contestant should be allowed two entries in this event. The second, or alternate, aircraft may be used only if the first aircraft is not safely flyable. Only the contestant who has entered the aircraft may pilot it in this event. Consideration for the safety of spectators, contestants, and contest personnel is of the utmost importance.

3. MODEL AIRCRAFT REQUIREMENTS

RCM Quickie 200 with no change in plan shape or reduction of area. The Quickie 200 uses a stock Ace foam wing with ailerons as per the RCM Quickie 200 plan. No modifications to the airfoil will be allowed. The aircraft will be fitted with a fixed two wheel landing gear that would permit the airplane to ROG.

4. ENGINE

Maximum total nominal engine displacement shall be .0519 cubic inches. Engines must be stock production units assembled from factory available parts. Engine and all parts, whether original or replacement, must have been produced in quantities greater than 1000 units and be available through normal retail outlets in the USA or from the engine manufacturers. No pressure will be allowed.

5. ENGINE CLAIMING

The top three placing engines may be claimed at the end of the racing event for the suggested manufacturer's retail price of that engine or another new engine plus $5.00 by any of the other competitors.

6. THROTTLE

No throttle shall be required for this event.

7. MUFFLER

At the discretion of the contest director and as notified in advance publicity prior to the contest, a specific muffler may be required depending on local operating conditions and restrictions. All aircraft will use the same stock mufflers.

8. PROPELLERS

Any stock plastic or wooden two blade fixed pitch propeller that is readily available through normal retail outlets may be used.

9. WEIGHT

Weight of the airplane, less fuel but including all equipment necessary for flight, shall be not less than 20 oz.

10. FUEL

Fuel will be supplied by the host group and shall not contain more than 30 percent nitro.

11. IDENTIFICATION MARKINGS

Models competing in this event will bear the contestants AMA number or the last two or three digits of the contestants AMA number followed by the first letter of the contestants last name. Identification numbers shall be at least 1" high.

12. WORKMANSHIP

The Contest Director is empowered to disqualify any aircraft which, in his opinion, is not up to reasonably safe standards in materials, workmanship, detail design, equipment installation, or condition as a result of crash or damage.

13. OPERATION OF THE QUICKIE 200 RACE

A maximum of four aircraft will be flown in each heat. Take-off will be by simultaneous hand launch. Each heat will consist of ten complete laps of the racing course. Officials will stand in close proximity to the pylons to record pylon cuts.

Engines must be started a maximum of 1½ minutes after the signal to start is given.

All laps are to be flown counter clockwise with turns to the left.

All contestants must be given an equal number of opportunities to race.

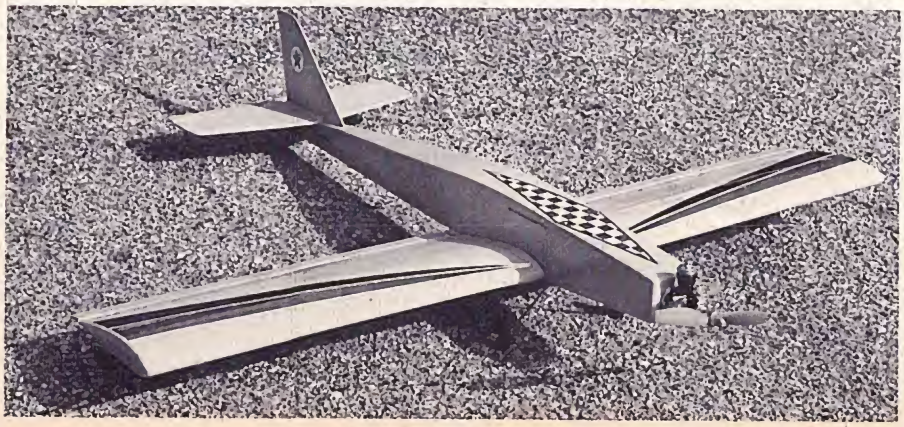
14. SCORING

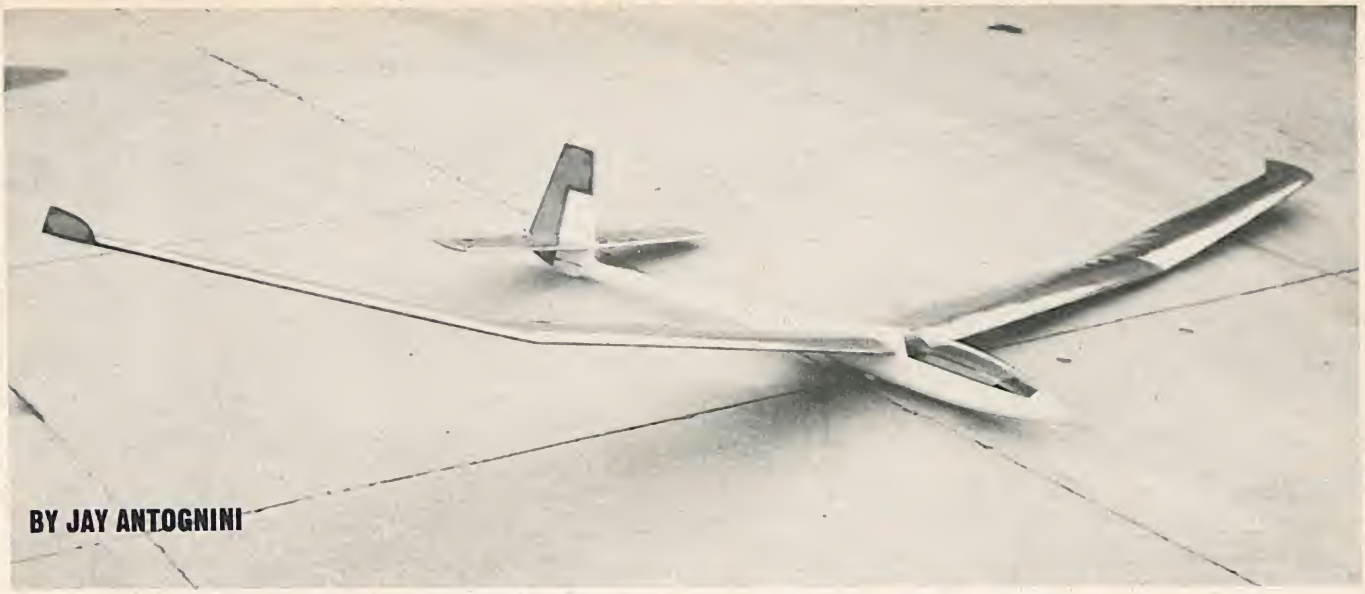
After completion of each heat, the pylon judges and starter will note any cuts and score the race in the following manner: 4 points for first, 3 for second, 2 for third and 1 for fourth. If a pilot cuts one pylon and still finishes the race, only one point is awarded (automatic fourth place as he is one lap behind). Two cuts result in a zero for the heat. Planes finishing without cuts will be given full points award, i.e. first across the finish line with one cut will be awarded one point. Second to finish, no cuts will receive 4 points, etc. There are no make-up laps. The winner of the event is the contestant who has accumulated the most points after the conclusion of all heats.

• • •

We feel that we must comment on several aspects of the preceeding rules. Every attempt was made to equalize the most important factors with regards to aircraft speed i.e., the wing and the power output of the engine. Selection of a prop will allow for experimentation but using the propeller unmodified reduces the effectiveness of the racing specialist. The claiming clause should discourage the use of custom or cleverly reworked engines or at least allow them to be shared which will put other persons in the winners circle until that engine is no longer effective. With small engines especially, the fuel is the most determining factor of the power output of the engines so let everyone use the same fuel whether it be commercial or special blend.

We feel very strongly about having an event that does not require the pilots to be engine and propeller specialists along with being a chemist to have fun racing and still be competitive. □





BY JAY ANTOGNINI

THE SUPER CIRRUS

The author of this article, Jay Antognini, is a member of the American Institute of Aeronautics and Astronautics, the Soaring Society of America, the League of Silent Flight, and the Soaring Union of Los Angeles. In addition, Jay holds a B.S. degree in Aeronautical Engineering from California State Polytechnic University and is presently working as an engineer in the Flight Dynamics and Flight Controls Analysis group of the B-1 Division of Rockwell International. The purpose of this article, a modification to the popular Graupner Cirrus kit, is an attempt on the part of the author to show how modifying a highly renowned design can improve its performance in certain areas as well as allowing the builder with very little engineering experience to learn more about what makes his aircraft perform, and then to do some experimenting on his own. In the case of the Graupner Cirrus, there are many restrictions to the design due to the fact that this sailplane is designed as a scale aircraft. While its performance has already made it one of the most popular sailplane kits ever produced in the world, the modifications included in the following article will detract from its scale appearance while adding immensely to its appeal as a high performance thermal machine. - - - Don Dewey

The Graupner Cirrus is a fine sailplane when built right out of the box, but its thermal performance and handling qualities can be increased by a few simple modifications. Since the purpose here is to present the changes and how to incorporate them into the kit construction, no detailed effort will be made to explain the aerodynamics behind the performance and handling quality changes although the actual improvements due to the changes will be discussed.

Polyhedral was added to the basic design to improve the turn capability and stability. These two properties are shown in the airplane's exceptional thermalling capabilities, and by perfect tracking on the tow with no rudder control required. The wing span is extended by approximately 4'' to decrease the wing loading, thereby resulting in a lower sink rate and tighter turns. Wing tip fins were added to decrease the induced drag and also to produce outstanding stall characteristics. With the wing tip fins installed, no washout is required, which, in turn, results in a wing with a greater lifting capability. The horizontal tail was swept forward to better balance this control surface. The rudder was lightened to further reduce the airplane's wing loading while also decreasing the airplane's inertia. The partially balanced rudder results in much better turning capability, including quick and crisp entry and exit from spins, and excellent slow speed turns during spot landing attempts. Quik Stripe 1/8'' trim tape is placed in appropriate places on the wings, horizontal tail, and rudder in order to reduce the total airplane drag by controlling the airflow over these surfaces. The Center of Gravity and tow hook positions employed result in perfect tows, and excellent flight characteristics.

Let's take a quick look at the kind of performance that can be expected from the Super Cirrus. The first flight of the Super Cirrus took place at the Soaring Union of Los Angeles (SULA) soaring field at California State College at Dominguez Hills, and resulted in a 21 minute flight which was the longest flight of the day. The next weekend saw a 10 minute test flight involving two loops, three stalls, and one spin. The Super Cirrus then put in a 30 minute flight topped that day only by an experienced contest pilot putting in a 31 minute flight with an eleven foot span airplane.

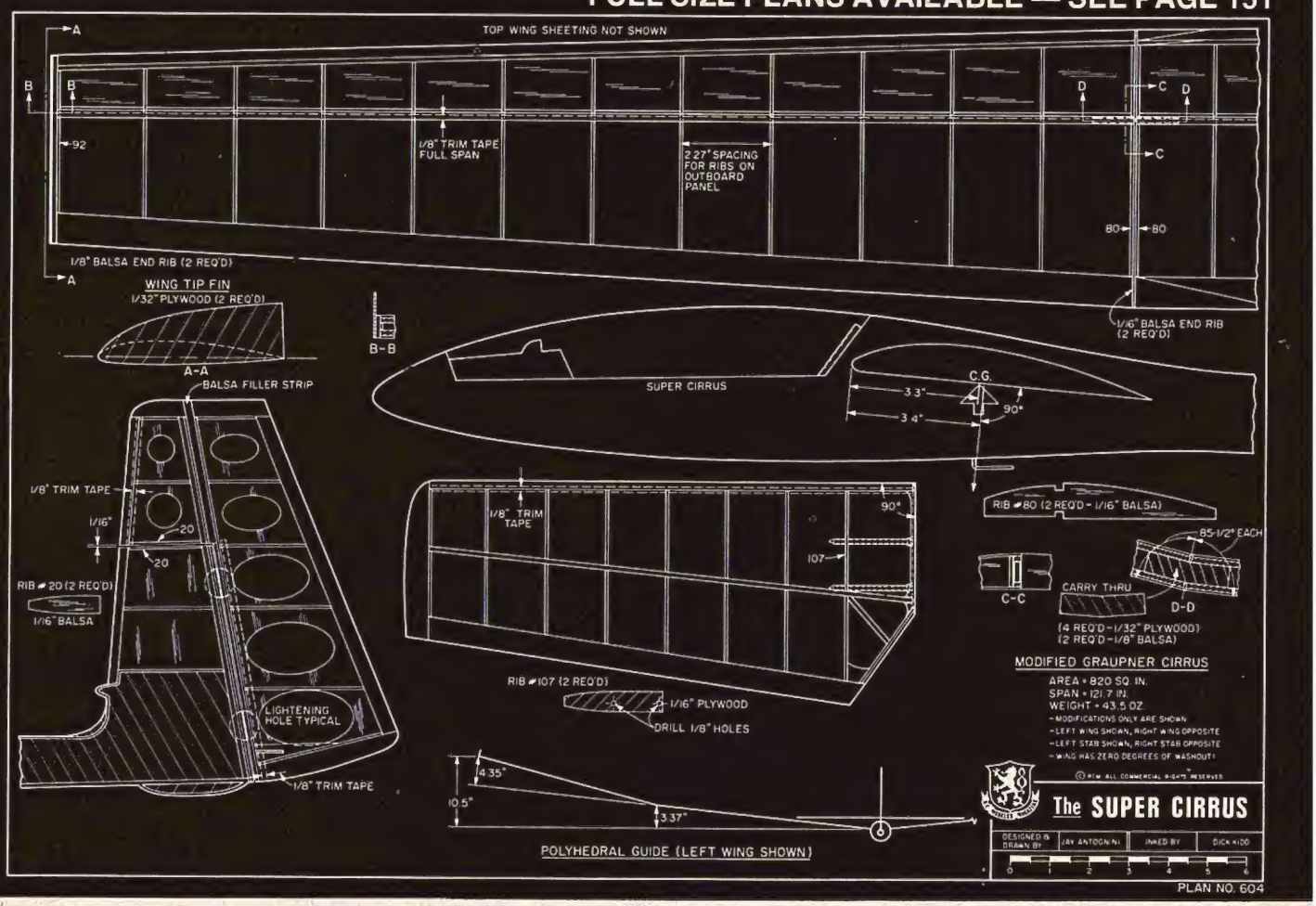
The modifications are actually quite simple, and are very easy to follow with the help of the Super Cirrus modification plans and the plans provided with the kit.

Wings: Each wing is constructed in two panels by using one extra rib #80. Each rib #80 is glued at an angle of 85½ degrees to the lower spar in that panel. Before we get too far we have to increase the rib spacing on the outboard panel two tenths of an inch in order to get our span increase. After the two panels are constructed, a 1/16'' balsa end rib is added to the inboard panel. Rectangular holes are then cut in the end rib and ribs #80 in order to insert the carry through spar into the panels. The carry through spar is a ''sandwich'' constructed of 1/8'' balsa between two pieces of 1/32'' plywood. The carry through spar is epoxied into the inboard panel which is then epoxied to the outboard panel making sure that the angle between the two panels is correct before the adhesive hardens. All we need to do now is glue on a 1/8'' balsa end rib to rib #92 instead of the stock wing tips, followed by a 1/32'' plywood wing tip plate.

Horizontal Stabilizer: The construction of the horizontal tail is almost identical to that indicated on the kit plans. The only difference is that the tail is swept forward so that the leading edge is perpendicular to the fuselage. The only new parts needed are two new ribs #107 made from 1/16'' plywood with holes drilled to match the new position of the brass tubes.

Vertical Stabilizer, and Rudder: The vertical stabilizer and rudder are basically built as per the kit instructions with the exception that there are two ribs #20 which are spaced 1/16'' apart. The rudder is then

FULL SIZE PLANS AVAILABLE — SEE PAGE 151

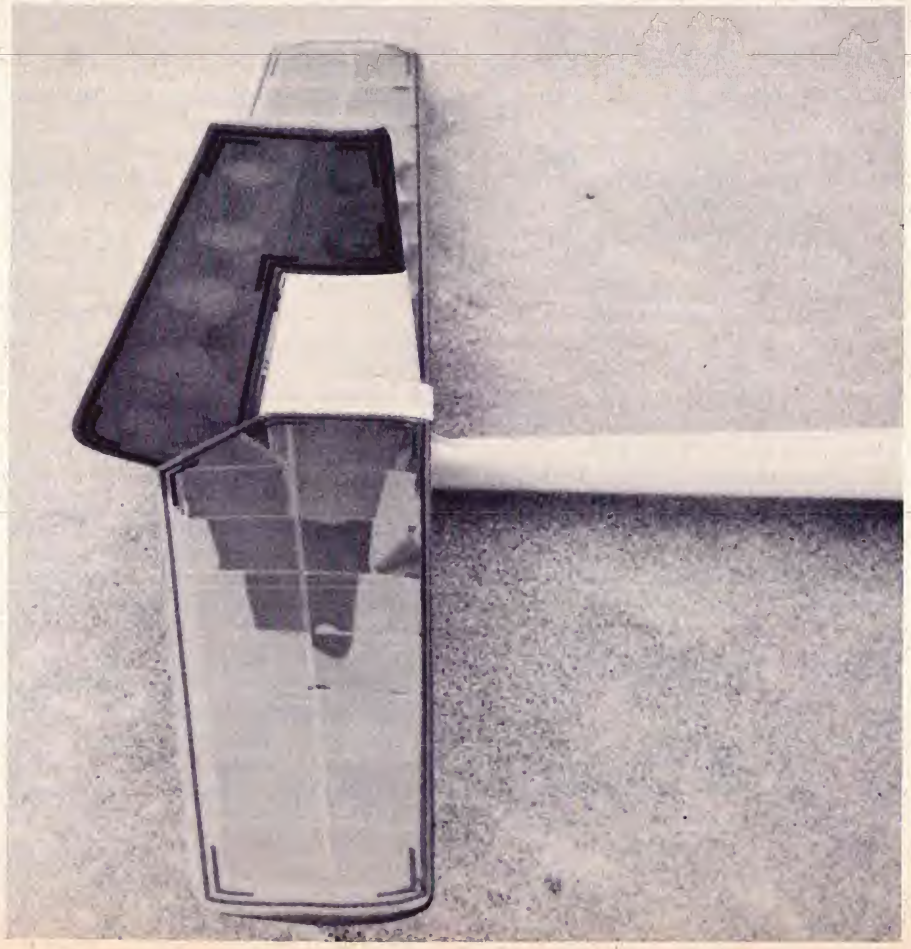


hinged to the vertical. The space between the two is then filled with a balsa strip from the top rib #20 to the top of the two surfaces. The two surfaces are now one. To get your partially balanced rudder all you have to do is cut between the two ribs #20. After making the cut and unhinging the two surfaces the lightening holes are then cut in the rudder.

Finishing: Cover the wings and control surfaces with Super MonoKote while taking care to do a smooth clean job. Make sure that the wings have zero degrees of washout. Quik Stripe 1/8" trim tape is placed on the wings and control surfaces as shown on the modification plans (at the back of the sheeting for the wings, and just aft of the leading edges on the control surfaces). With the functional trim tape installed now add trim tape to spiff up the airplane in your own special way, being sure not to put any tape forward of the tape on the wing sheeting.

Center of Gravity, and Tow Hook Placement: The C.G. is placed 3.3" aft of the wing root leading edge. The tow hook is placed at the intersection of a line drawn perpendicular to the wing root lower surface 3.4" aft of the leading edge, and the bottom of the fuselage.

That's all there is to it. When you take your Super Cirrus out for its first flight, I'm sure you'll be as pleasantly surprised as I was. Good luck, and super soaring with your Super Cirrus. □

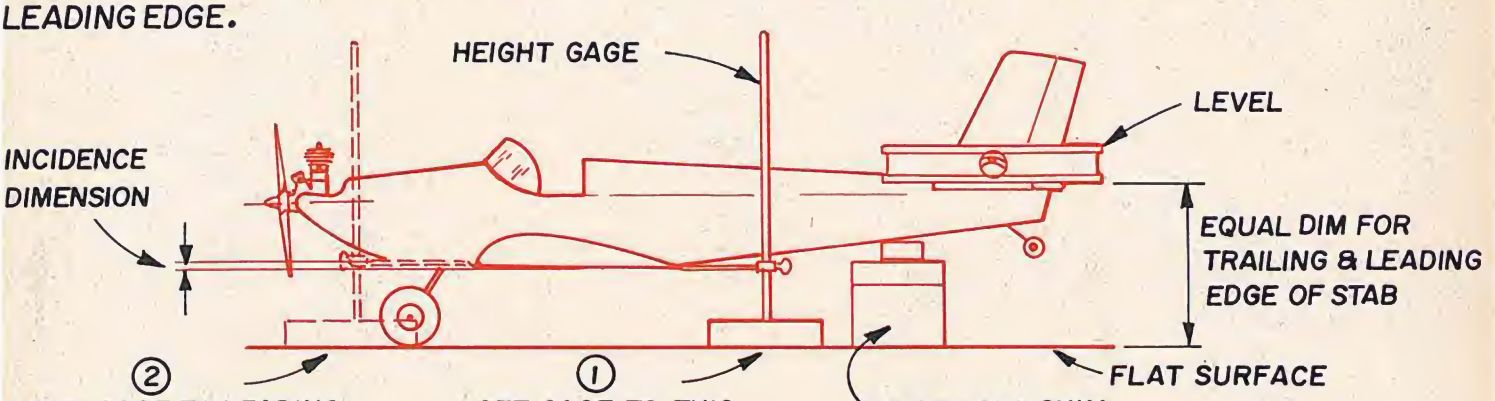


HERE'S HOW

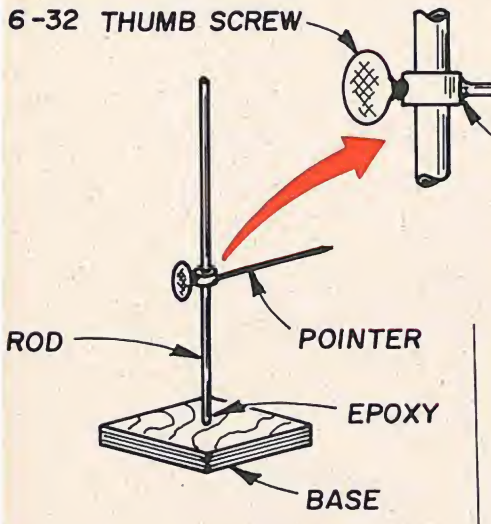
BY JERRY SMITH

MOST MODELERS COMPLETE AN AIRPLANE, GIVE IT A CURSORY CHECK FOR WARPS, LIFT IT BY THE WING TIPS TO CHECK THE CG, THEN HEAD FOR THE FLYING FIELD HOPING IT WILL FLY. SOME MODELERS REFUSE TO DO THIS MUCH. HOWEVER, MOST MODEL AIRCRAFT PLANS INCLUDE THE CG, ENGINE THRUST AND WING INCIDENCE FOR A PURPOSE. AND THAT IS — **TO HELP YOU AERODYNAMICALLY BALANCE YOUR AIRCRAFT BEFORE YOU FLY IT!**

TO GIVE YOU FURTHER ASSISTANCE, I SUGGEST THIS SIMPLE MEASURING DEVICE TO CHECK YOUR WING INCIDENCE. MEASURING FLAT BOTTOM WING INCIDENCE IS QUITE SIMPLE. WITH SEMI AND FULL SYMMETRICAL WINGS, THE CENTER LINE MUST BE ESTABLISHED ON THE LEADING EDGE BEFORE DETERMINATION OF INCIDENCE. DO THIS BY PLACING THE AIRCRAFT ON A FLAT AND LEVEL SURFACE. BLOCK UP THE TAIL AND LEVEL THE STAB CENTER LINE WITH THE MEASURING SURFACE. PLACE THE HEIGHT GAGE 4 TO 6" FROM THE FUSELAGE CLOSE TO THE LEADING EDGE OF THE WING. NOW BRING UP THE POINTER UNTIL IT JUST TOUCHES THE THICKEST PART OF THE WING. MARK THE POINTER LOCATION ON THE ROD, JUST UNDER THE WHEEL COLLAR, WITH TAPE. FROM THE PLANS DETERMINE HOW FAR FROM THIS POINT TO THE ℄ OF THE AIRFOIL. CAREFULLY MOVE THE POINTER UP THIS DISTANCE PLUS 1/2 THE POINTER DIA. THE POINTER ℄ IS NOW ON THE AIRFOIL ℄. MARK THIS LOCATION ON LEADING EDGE. NOW MEASURE TRAILING EDGE AND COMPARE WITH MARK ON LEADING EDGE.



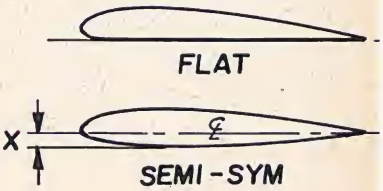
TYPICAL SET-UP TO MEASURE WING INCIDENCE

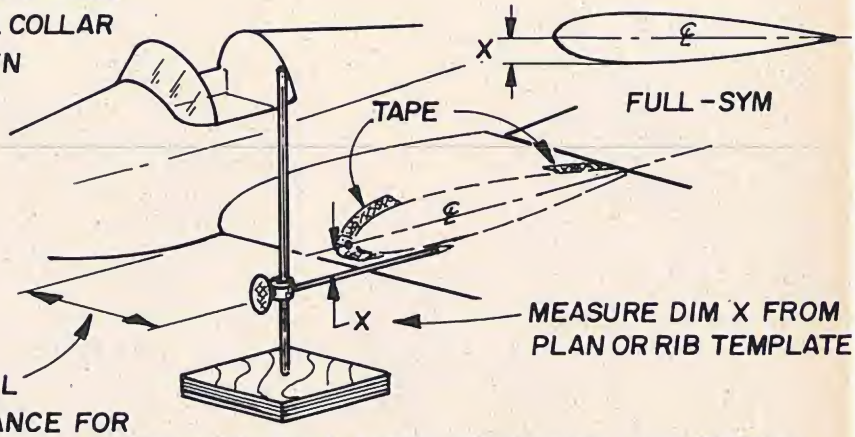


HEIGHT GAGE

MATERIAL REQUIRED:
BASE - 3/4" X 6" X 6" PLY
ROD - 5/32" DIA WIRE
POINTER - 3/32" DIA WIRE
WHEEL COLLAR - 5/32"
THUMB SCREW - 6-32

TYPICAL AIRFOILS





DISTANCE FOR TRAILING AND LEADING EDGE. MARK MEASURING LOCATION ON TAPE.

FOR SEMI AND FULL SYMMETRICAL WINGS

RAISE POINTER TO BOTTOM OF WING, ADD DIM X PLUS 1/2 DIA OF THE POINTER.


AMA
288
AMA
288

Dirty Birdy

BY JOE BRIDI

Text By Ben Strasser

The Dirty Birdy is a new pattern ship by Joe Bridi whose Sun Fly series and Kaos pattern aircraft have become almost legendary in competition circles. All-up weight, including retracts, ranges from 7¾ to 8½ lbs. and, with a wing area of 688 sq. in., this new ship has been expressly designed for the current AMA and FAI Patterns.

Since the first flights of the prototype, the Dirty Birdy has proven itself to be a superb pattern ship. The design makes it a gentle and rock steady flier with absolutely no snap roll tendencies. Even though the clean design makes a ship that moves out well in the air (from 80 to 100 mph), the landings are as slow as you'll want them to be. 2° of down thrust is used on the engine with no right or left thrust required. Response to the use of the control surfaces is extremely smooth. A minimum of surface deflection is all that is necessary for it to perform to absolute perfection. As a result, the plane is a very predictable and reliable ship that you will really enjoy on those Sunday morning flying sessions or at contest time.

Since most construction articles presented in model aviation magazines are necessarily short due to space limitation in each publication, we have asked RCM's Contributing Editor, Ben Strasser, to present a complete step-by-step construction article with full material list in order that you may build the Dirty Birdy in the shortest possible time and with as complete a set of instructions as is possible to present. For this reason, this article is divided into two parts. The conclusion will appear in the July 1975 issue of R/C Modeler Magazine. In this first segment, you can assemble the materials while waiting for your set of plans to arrive from the RCM plans department. The canopy is available from the RCM Products Division and, when your plans arrive, you can proceed with Ben's instructions to cut out a complete "kit" for yourself with the full construction of the aircraft appearing in the conclusion of this two part series. - - - Don Dewey

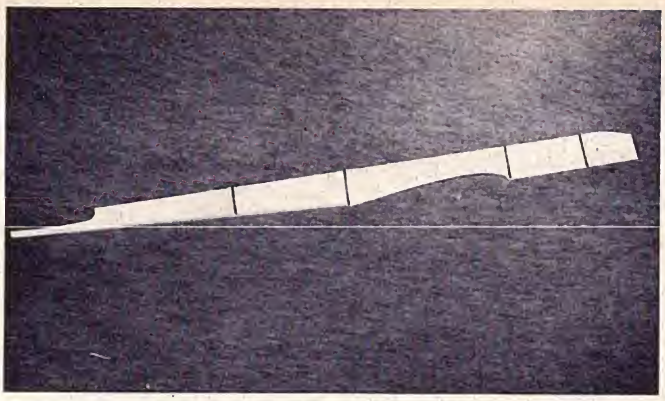
PART I

If you want to get your own DB going, your first step is to put a kit together. To save you time, we've prepared a list of the wood and hardware you'll need to get the job done. It's at the end of this article so you can cut it out without messing up our glorious building notes. Before you begin cutting the parts though, there are some other comments we want to make. First and foremost, the hotter the engine the better. If you fly one of the real "go-ers" like the new Webra, put in a 14 oz. tank if you want to fly the whole pattern without running out of fuel. A Sullivan SS-14 fits well. The size and shape of the canopy is critical for the superb flight characteristics of the plane. If you care about that sort of thing, the canopies are available from RCM Products Division, P.O. Box 487, Sierra Madre, California 91024. You can, of course, make your canopy from a hollowed-out balsa block or make a plug and shape your own. If you've done a lot of scratch-building you probably have your own techniques for marking the wood to cut out the pieces. If this is one of your first attempts, one way is to work with a double set of plans. Cut up one set. Put household rubber glue onto the back of the

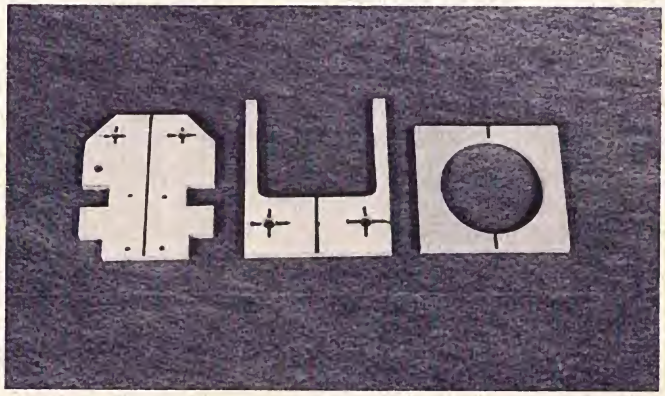
paper pieces and glue them to the wood. Or do it the easy way and buy a set of RCM's adhesive backed templates for the plane with the plans. As you read through the cutting notes that follow, watch for the marker (☆). Each one means you've read everything about that part and you're ready to get your knife or jigsaw going. Now, to quote a friend of ours by the name of Marvin Barnsworthy, "It's time to get a'whittlin."

The Fuselage Parts

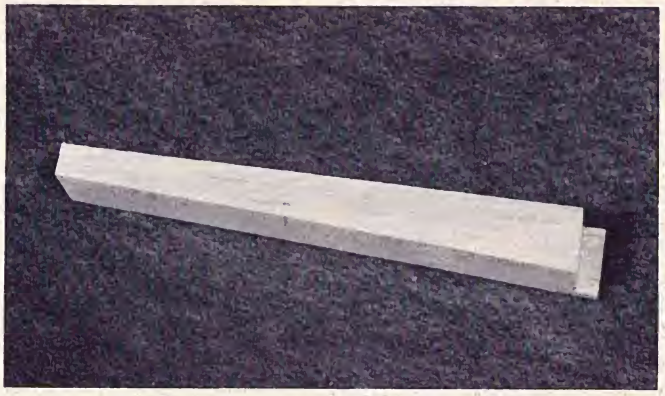
The *top block* is cut from 3/8" x 4" balsa. Cut a 3/8" x 8" slot in the back end of the top block for the two rear fin sections. See plans.☆ Cut the *bottom block* from 1/4" x 4" x 36" balsa. Because of the thickness of the balsa, the bottom sheeting is cut in one piece.☆ The *fuse sides* are to be cut from 3/16" x 3" balsa. However, since the fuse is 50" long, a 17¼" length of 3/16" x 3" balsa sheet will first have to be joined to each of 2 pieces of 3/16" x 3" x 36" balsa. For maximum strength, the glue joint should be cut at 45° to the grain of the wood. See plans.☆ With the 17¼" piece joined to the 36" piece, the prepared sheet of 3/16" balsa for the fuse sides will be 50" long. Cut the fuse sides from the two 3/16" x 3" x 50" balsa sheets. The glue joint should be located about one-third back of the front of wing saddle. A ply doubler is added to this area later. Note that the cut-out for the stab begins with a straight cut down to the middle of the leading edge of the stab. The cut-out then follows the contour of of the bottom of the stab to the rear of the fuse.☆ Cut the *servo compartment doublers* 1¾" x 13" from 1/32" ply.☆ *Bulkheads* 1 & 2 and the two *fuselage wing hold-down plates* are cut from 1/4" ply.☆ Cut the notches for the motor mount rails into bulkhead 1. Use the 3/4" triangular stock as a guide when cutting the top angled corners of bulkhead 1.☆ Drill two holes in bulkhead 2 for the wing dowels.☆ Cut *bulkhead 3* from 1/4" x 4" balsa so grain runs from top to bottom.☆ The *sub fin* is cut from 3/8" x 4" balsa. The *fuel compartment side blocks* are 3/4" x 7/8" x 7" and are cut from 3/4" x 4" x 36" balsa plank. The back end of both side blocks is notched out 11/16" deep by 1/4" long to allow the side block to overlap bulkhead 2. When properly cut out, the fuel compartment side block will overlap bulkhead 2 to be flush with the 3/16" fuse sides. Sand the end of the block that glues to the front of bulkhead 2 to a slight angle so the block will conform to the angle of the sides.☆ The *fuel compartment bottom block* is 3/8" x 3½" x 7" and is cut from 3/8" x 4" x 36" balsa sheet.☆ The *fuel compartment top block* is cut from the same balsa sheet.☆ Cut the two *top block stringers* to width from the 3/8" x 2" x 36" balsa.☆ The hardwood *motor mount rails* are cut to shape from 1/2" x 1¼" x 12" beech. Note that they are cut out in the area of the fuel tank compartment for the fuel tank.☆ The two *motor mount supports* are 5/8" x 3/4" x 4" and are cut to shape from 3/4" x 4" x 36" balsa. From the top view they are the same shape as the front of the motor mount rails.☆ The *chin block* is 3/4" x 3½" x 4" and is cut from 3/4" x 4" x 36" balsa. The 1¼" x 1½" x 2⅜" *upper spinner ring filler block* is cut from the piece of 2" x 4" x 6" balsa plank.☆ Cut the *spinner ring* from 1/16" plywood.☆ The two *wing fillet base pieces* are cut from 1/32" plywood using the template provided on the plans.☆ Finish up the fuselage portion of the kit by cutting the various *cross braces* from 1/4" x 3/8" balsa. One cross brace is located in the center of the servo compartment, another at the location of the fuselage. Note that the cross braces are cut to fit between the top block stringers.☆ Cut the *vertical support braces* for the fuse sides from the 1/4" x 1/4" balsa. They are located on each fuse side behind bulkhead 3. The bottom of each brace should be angled to mate with the 1/4" triangular stock on the bottom of the fuse side.☆ Also cut the *bottom block cross brace* from 1/4" x 1/4" balsa. It should be 2⅛" long.☆



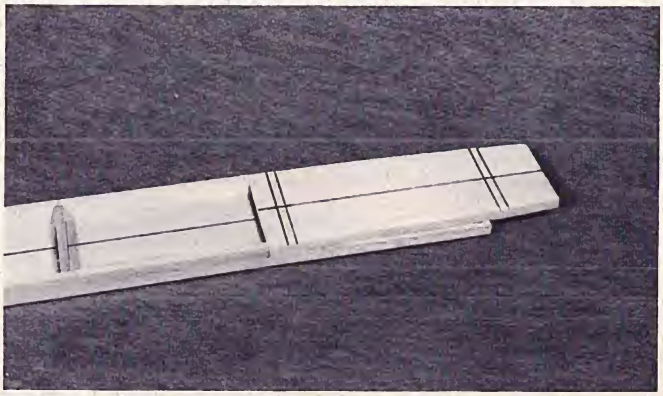
Fuselage side showing wing and stab cut-outs.



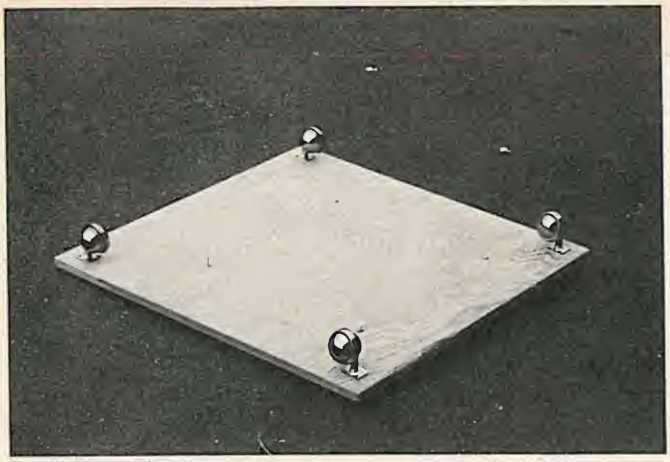
Bulkheads 1, 2, and 3.

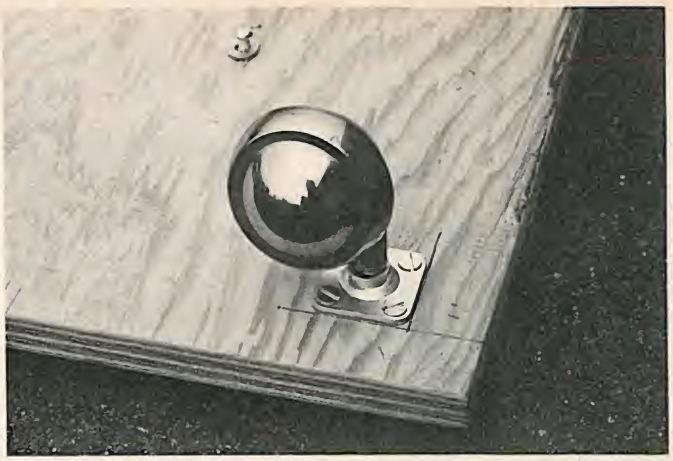


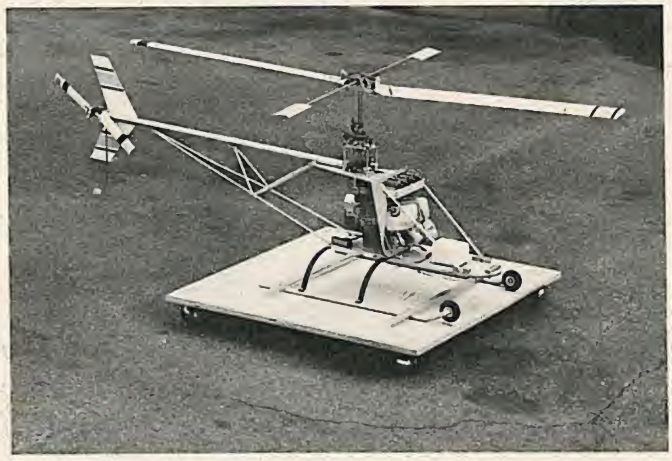
Balsa side block showing cut-out for bulkhead 2.



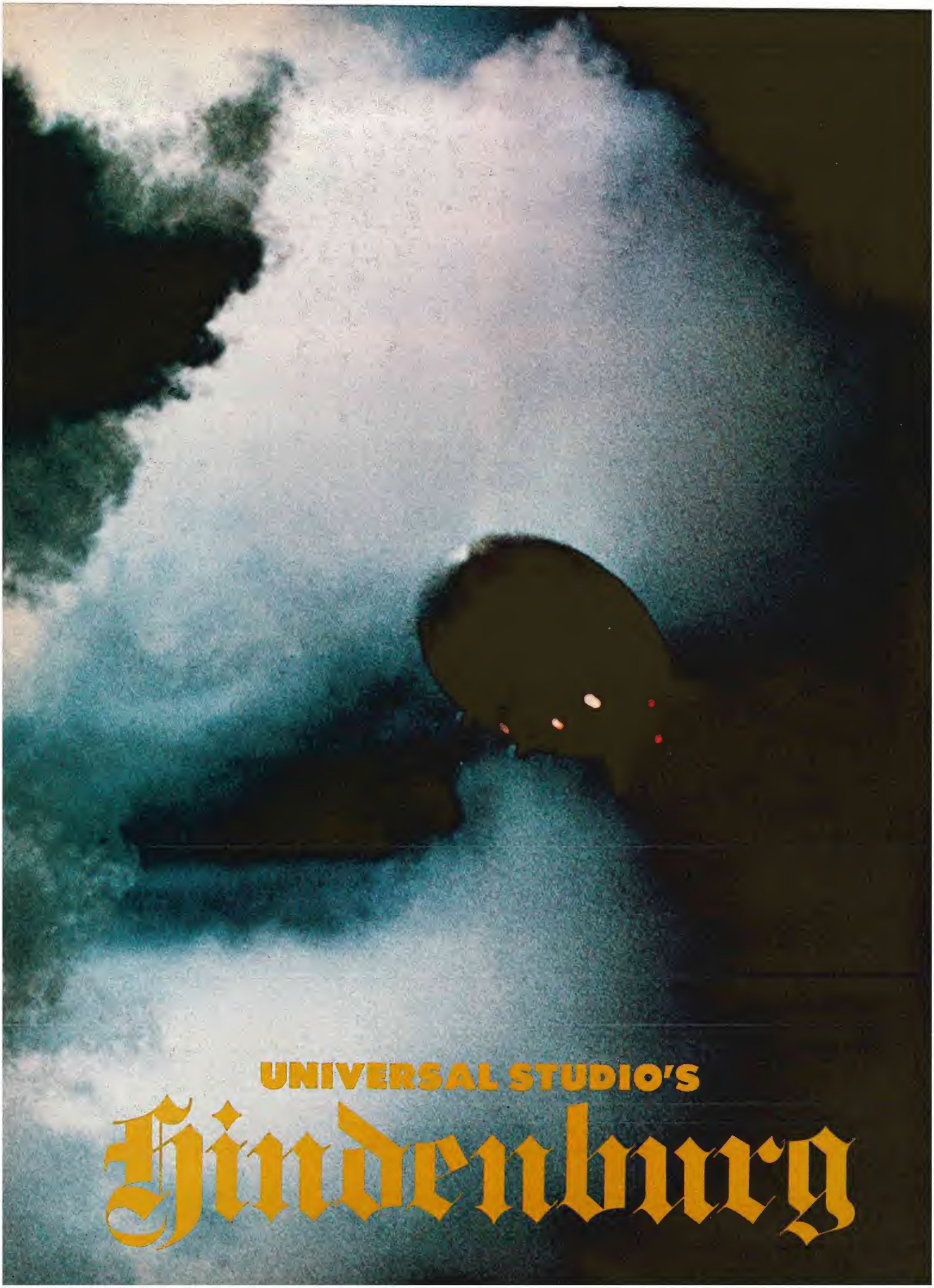
Fuselage top block with engine compartment top block in place.







TOP ROW, LEFT: Bottom view of the helicopter 'dolly.' RIGHT: Close-up of flange mounted Shepherd caster. 2ND ROW, LEFT: Du-Bro Shark mounted on 'dolly.' RIGHT: Walking behind the chopper. ABOVE, LEFT: Walking beside the 'dolly' in forward motion. RIGHT: Making a coordinated cyclic and tail rotor turn around yourself. LEFT: Maneuvering the chopper straight backwards. When you get to this point, try some Figure Eights.


UNIVERSAL STUDIO'S
Hindenburg

The German Hindenburg was the largest and the last of the giant lighter-than-air ships that carried passengers across the Atlantic in unvelievable luxury. This chapter in the history of flight came to an end, on May 6, 1937, at Lakehurst, New Jersey, in one of aviations worst disasters. This Fall you will see Universal Studios movie, ''Hindenburg,' starring Anne Bancroft and George C. Scott. This exclusive RCM article, by Dick Burkhalter will take you behind the scenes at Universal Studios for an inside look at one of the most remarkable and ambitious radio control projects in modern cinematography.

It is a well known fact that models have played a large part in the business of movie-making. Since the earliest days of motion pictures, miniatures of all types have been used in place of their full size counterparts. Models offer many advantages in terms of costs, controlability, availability and sometimes expendability.

The use of radio control, somewhat slow in catching on, is becomming more prevalent as movie producers are made aware of the immense capabilities and relatively low cost of these miniaturized guidance systems. A fairly recent example featured on these pages was the R/C seagull built by Mark Smith for the movie ''Johnathan Livingston Seagull.'' Not quite so well publicized have been the use of radio control models and devices in other feature films and series episodes for television. But by far the most ambitious project to date, as far as R/C modeling is concerned, is the scale Hindenburg airship constructed at Universal Studios for the movie ''Hindenburg,'' starring George C. Scott and Anne Bancroft, to be released this Fall.

For readers not familiar with the story of the original Hindenburg, a little background information is in order. The Hindenburg was the last and the largest in a line of lighter than air craft built in Germany in the years preceeding World War II. In those days, prior to the development of high altitude, long range airplanes, airships like the Hindenburg and Graff Zepplin presented an attractive alternative to ocean liners. Taking only two days for an ocean crossing, as opposed to the Queen Mary's six day trip, airships saved time while offering their passengers luxury equal to the big ocean liners. The Hindenberg carried 97 passengers, and the smaller Graff Zepplin carried 62. Both offered spacious cabins, elegant dining rooms and entertainment in their lounges, and both made numerous flights from Germany to the United States and South America.

This chapter in the history of flight was brought to a close forever on the evening of May 6, 1937, when the Hindenburg was destroyed by fire while attempting a landing at Lakehurst, New Jersey at the end of a stormy ocean crossing. Thirty-five of the 97 passengers aboard were killed in the crash; many others were severly burned and disfigured for life.The cause of the fire has never been determined, but the Graff Zeplin was immediately taken out of service and a new airship, the LZ-130, then under construction, was completed.

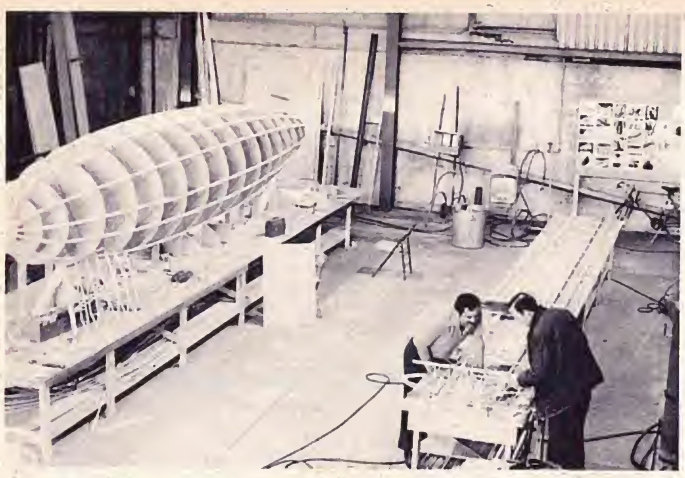
The creation of the scale model Hindenburg began nearly two years ago, when the decision was made to produce the movie. A model would have to be built, since there are no dirigibles left in the world. Art Director Ed Carfagno and Unit Manager Ernie Wehmeyer were sent to Germany to gather information and background material. While this trip was successful from the standpoint of providing data on costumes and settings for the period, little was found which would aid in the building of the model. A few photographs and some small drawings were all they could produce. Additional documentation was unearthed by the studio's Research Department during the project, however, and the finished product must be considered as accurate as humanly possible to achieve. The accuracy is attested to by no less an authority than the Smithsonian Institution, which has asked to acquire the model and full scale pilot's gondola for inclusion in their permanent collection. As of this writing, it is expected that the request will be granted. (Other full size portions of the Hindenburg constructed at Universal include a portion of the nose section, 70 feet high and 60 feet long, a portion of the center underbelly 45 feet high and 150 feet long, a portion of the rear fuselage and lower rudder, and a mockup of the passenger lounge which was mounted on a 60 ton gimbal that could be tilted nearly 30 degrees in any direction. These were all destroyed in filming the fire and crash scenes.)

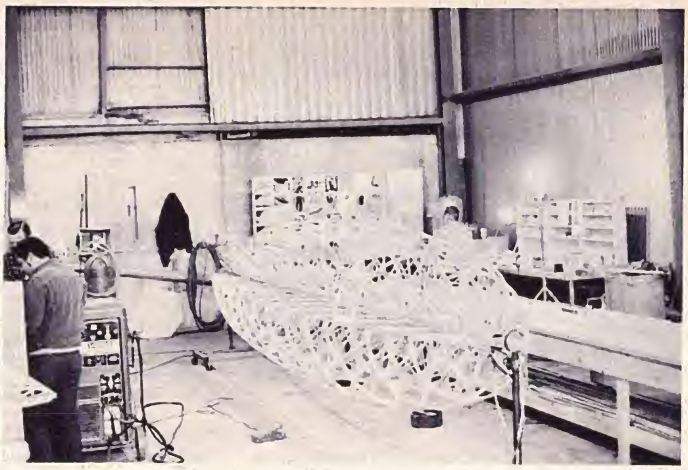
The Special Effects team charged with construction of the model, headed by Bob Beck and Walt Lapwood, began construction of the 3/8'' scale model on April 4, 1974. Their first step was to build a wood mockup of the fuselage on a table of 3/4'' Structo Board. This mockup consisted of circular bulkheads of 1/4'' plywood spaced 18'' apart, connected by stringers of 1/8'' by 1'' pine. The only documentation available at this time were a few photos and a small three-view drawing which, to any dedicated scale modeler, would be considered crude. The mockup was checked and adjusted against the photos until the shape of the fuselage was ''eyeball'' perfect. At this time, the shape and location of the various details such as the engine nacelles and pilot's gondola were determined. Wood forms for these parts were built, to be used for shaping of the final aluminum parts. This stage of the job was completed in about three weeks.

Once the shape of the mockup was approved, construction of the actual model was begun. A twenty-five foot length of four inch diameter aluminum tubing was used as a ''spine'', to which the framework was attached. Contrary to usual modeling practices, which would have been to build circular bulkheads and tie them together with stringers, the Hindenburg was built in a longitudinal manner. That is, a jig was built to facilitate construction of nine identical ''half-profiles'', which were welded to the central spine at 40 degree intervals. These half-profiles were built of aluminum angle and strip stock and resemble a bridge truss with one straight side (which attaches to the spine) and one curved side (which forms the outer contour of the model). As each of the half-profiles were completed, they were welded to the spine, and pie-shaped bullhead sections were welded in place to tie the structure together. When the basic framework was complete, additional stringers were welded on at ten degree intervals to finish the outline. During all construction, the model was supported on pedestals attached at the front and rear of the spine, somewhat like a giant RCM Painting Jig. This allowed the model to be rotated around its axis so the work could always be conveniently placed.

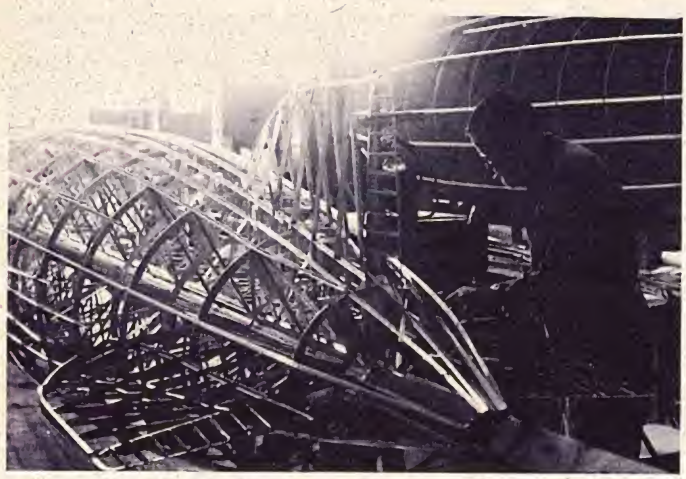
At the same time that the fuselage was being built, other craftsmen were assembling the rudders, elevators and details such as the pilot's gondola and engine nacelles. These were temporarily mounted in place to check for fit as they were completed. The installation of the radio gear and the various mechanical bits and pieces were made as each of these sub-assemblies was completed.

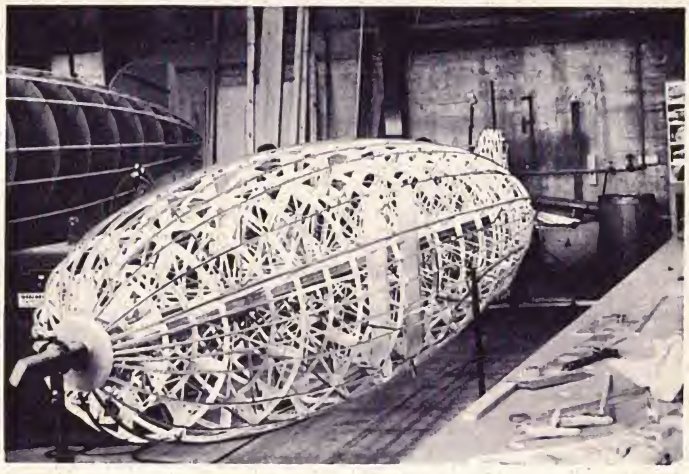
The covering material for the Hindenburg was by another product well known to RC'ers, Super Coverite. Three twenty-five foot rolls and numerous single sheets of this material were used. The Coverite was applied in the usual manner with sealing irons and heat guns. Many inspection hatches and doors for access to the internal

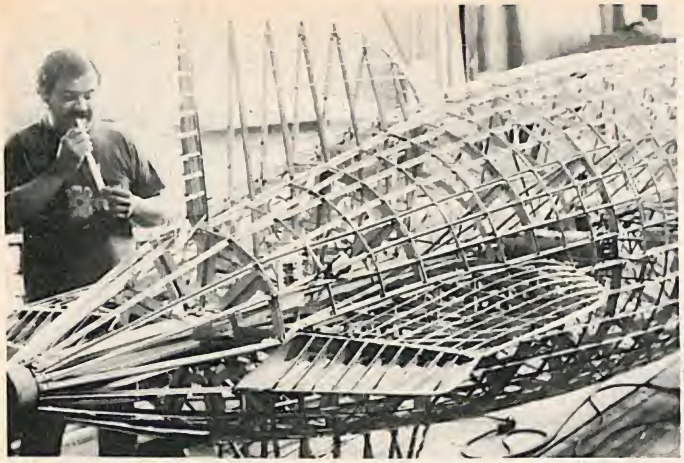


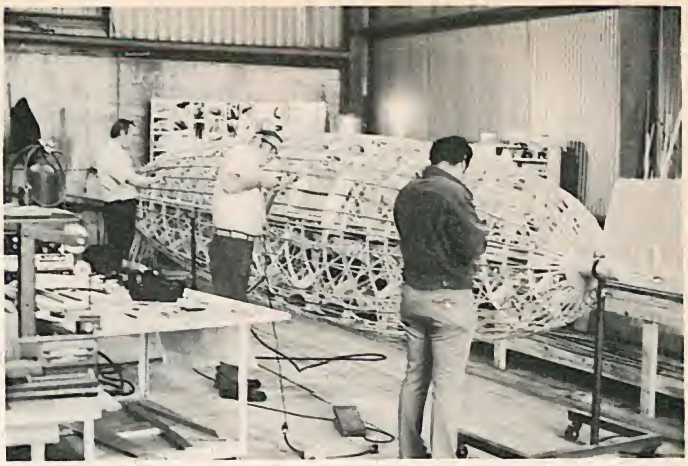


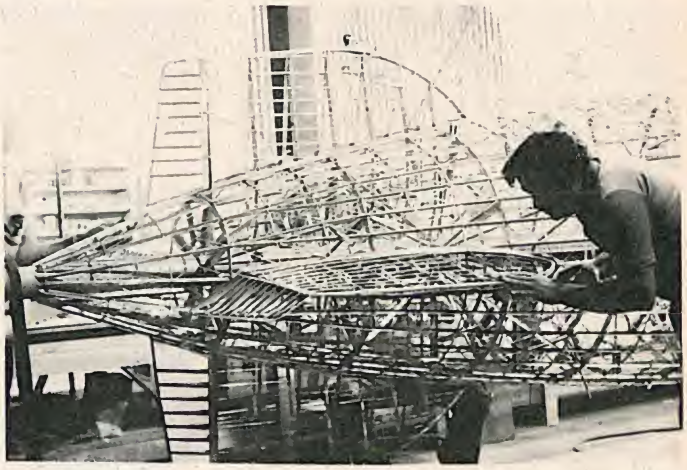
ABOVE, LEFT: Beginning of miniature construction, wood mock-up at left of photo, first half-profile on table. ABOVE, RIGHT: All half-profiles welded in place on central spine. Filling in of bulkheads still incomplete. RIGHT: Completed basic fuselage skeleton, less tail and fill-in stringers. BELOW, LEFT: Rudders and elevators welded in place. BELOW, RIGHT: Complete fuselage with tail in place. BOTTOM ROW, LEFT: Bob Beck with Hindenburg skeleton. Photos on rear wall comprise total documentation available at this stage of construction. RIGHT: Adding fill-in stringers.

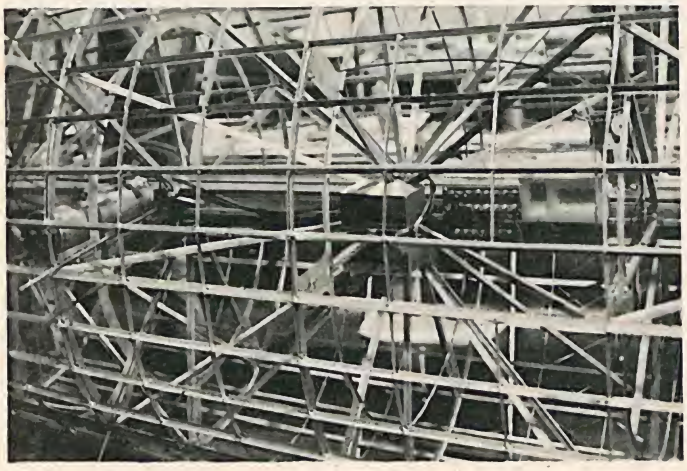


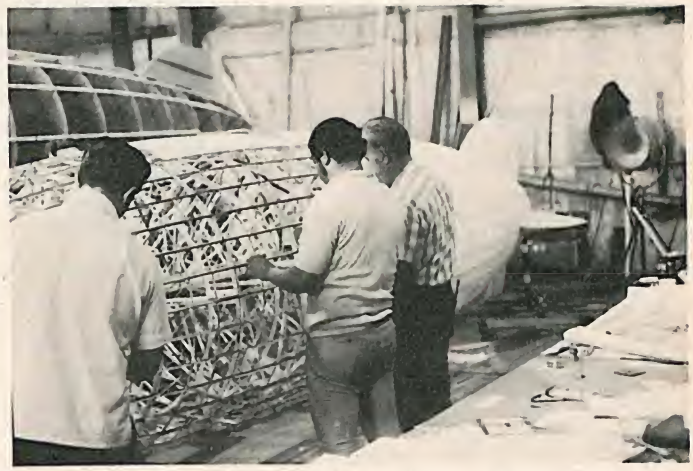












TOP ROW, LEFT: Detail being added to rear fuselage and tail section. TOP ROW, RIGHT: Fitting details – passenger lounge, engine nacelle mounts, access hatches. SECOND ROW, LEFT: Overhead view of fuselage framework. SECOND ROW, RIGHT: Finishing around the tail section prior to covering. ABOVE, LEFT: Interior close-up showing wire exterior X-bracing. ABOVE, RIGHT: Beginning the application of Coverite to the Hindenburg framework. LEFT: Covering complete, engine nacelles in place. This is bottom of ship – dark spot at front is location of passenger lounge.

workings of the model were individually covered. These all had to fit well, with no visible gaps that would mar the close-up photography.

The finish was rather unusual, and merits some discussion, as the techniques could be copied to advantage by interested scale modelers. It began with the application of three coats of Aero-Gloss clear over the bare Coverite. Following this, aluminum powder was applied to the dry doped surface by rubbing with cotton pads dipped in the powder. When the entire model had been burnished in this manner, it was sealed with four more coats of clear. Selected areas were then masked off and given additional burnishing, this time with lamp-black added to the aluminum powder to darken it. These areas were resealed with more clear dope. The resulting finish simulates the aging, repairing and recovering of various parts of the airship. Though weight was not of importance on the Hindenburg, I suspect that this technique would result in a lighter finish than using silver dope throughout. For those interested in experimenting with the technique, the aluminum powder is called Cres-Lite and is manufactured by Crescent Bronze Powder Company. It should be available in any well-stocked automotive paint store.

Selection of the radio equipment was made early in the project. Initial specifications for operating features determined that up to 30 channels of operation would be required. A detailed comparison of the major brands of R/C equipment was made, with particular emphasis being placed on those factors significant to the project. Some of these were:

Servo Performance — Plenty of power would be required to move the heavy rudders and elevators of the model, and for these functions, smoothness and precise centering would also be necessary, as the closeup photography would accentuate any jumpiness or "hunting" of the surfaces. For other functions, such as the dumping of water ballast, servo speed was considered of prime importance.

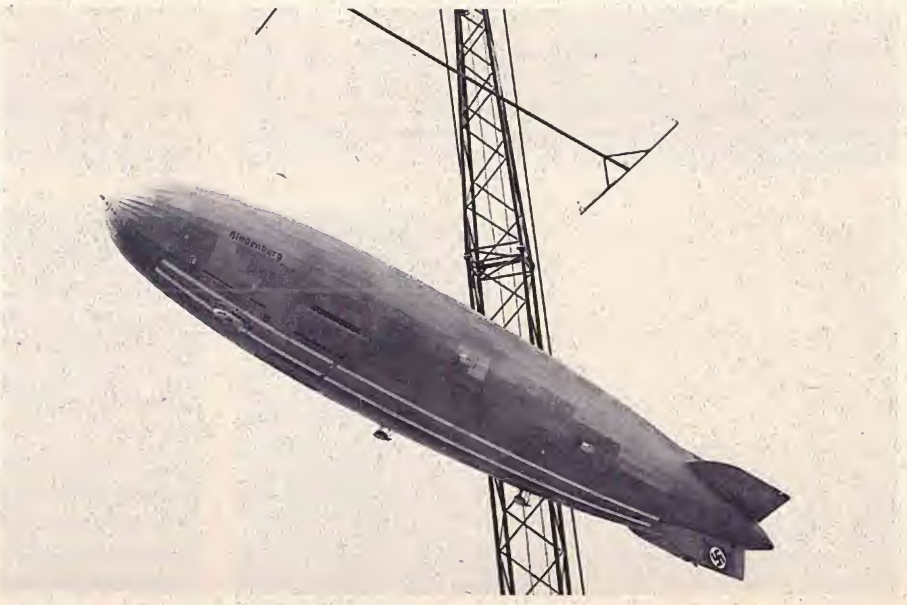
Temperature Stability —Because the airship would be left on unheated sound stages overnight and be expected to perform perfectly under the intense heat generated by the movie lighting, the ability to perform reliably at all temperatures was a major consideration.

Interference Rejection —The framework of the model is metal and a studio sound stage is a veritable rat's nest of electrical wiring. Therefore, it was important that the systems chosen be able to reject any stray signals and be oblivious to externally generated noise. With multiple transmitters operating simultaneously, it was also important that the R/C systems themselves didn't shoot each other down.

Cost and Availability — While it would be a mistake to jeopardize the success of a multi-million dollar film by attempting to skimp on the cost of relatively inexpensive R/C equipment, movie studios, like any

The Hindenburg on outdoor location.

The 300 lb. dirigible about to be crane hoisted.



The large crain hoists the model high overhead.

Studio workers prepare to hang the Hindenburg on Stage 12.

Painter, Sam Pritchard, coats support wires with dulling lacquer to render them invisible to the camera.

other successful businesses, must operate within a budget. Many, if not all, of the currently available radio systems meet the performance standards, but the systems chosen represent, to the studio, the best possible price/performance ratio. Availability comes into play in that radio system delivery and maintenance could not be allowed to delay production schedules.

When all of the above factors were taken into consideration and weighed carefully, the decision was made to purchase five Futaba Digital R/C systems; three six-channel and two five-channel, for a total of 28 functions. These were purchased through Reginald Denny's Hobby Shop in Hollywood, who not only delivered the original systems quickly, but also offered a plentiful supply of spare parts and could handle any service required.

As soon as the radios were on hand at the studio, design, construction and testing of the R/C functions was begun. Systems were constructed for the various operating features and tested in mockup form. Four Dumas-Pittman 12V boat motors were selected to simulate the airship's 1200 HP diesel engines, propellers for these being cut down and reshaped from regular Top Flite stock wood props. Experiments with commercially available speed controllers were not too successful, so more elaborate set-ups were made. These consist of variable rheostats driven off roller cams mounted directly to the servo output shafts. Water ballast dumps were rigged using compressed air bottles to maintain an even pressure of 10 psi regardless of tank level. The raising and lowering of the passenger and cargo doors and boarding ramps was accomplished via cable and drum arrangement triggered by servo motion, with micro-switches used to limit the travel at both extremes. A similar technique was used to retract and extend the three scale radio antennae and the fore and aft mooring lines.

The most complex of the scale funcitons was the control of the interior and exterior lighting of the Hindenburg; these functions alone occupy nine channels of operation. All lighting on the model is adjustable via servo-controlled rheostats. Individual lighting circuits can be activated separately or together, and a full range of brilliance, from the dimmest glow to full 24 volt power, is possible in each circuit. There are running lights on the top and bottom rudders and landing spotlights fore and aft on the belly of the ship. Inside, there are lights in the extreme nose, in the pilot's gondola, the passenger lounges and staterooms, and in the cargo compartments which run the full length of the ship. Two twelve volt automobile batteries inside the model provide the power for the lighting and the other electric motors required.

The Hindenburg "flies" on the sound stage via a unique system of wires and cables, all controlled via R/C. The model, itself, is suspended from a rectangular steel frame by four twenty foot lengths of 3/16" piano wire. This piano wire is treated with a

coating which kills any reflections and makes it invisible under the studio lighting. (And not just to the camera, but the naked eye as well from a distance of fifteen to twenty feet!) As the suspending frame is well above the model, it is always out of camera range. The frame is, in turn, hung from a track mounted on the stage ceiling by four lengths of 1/2" stranded steel cable. These cables are wound on drums powered by electric winch motors. Fore and aft winches are separately controlable so that the model may be tilted as well as raised and lowered. Forward and backward motion is possible through motors which propel the entire framework, winches and all, along the track. Two tracks were built on the stage. The first is a straight section, 180 feet long; the second is an S-curve and is over 200 feet in length. During filming, various backdrops are placed behind the model, and clouds or fog, if desired, are created. Three to six radio operators are necessary to control the Hindenburg, depending on the complexity of the shot.

No project of this magnitude is accomplished without problems, of course, but fortunately, construction and operation of the Hindenburg has been free of any major snarls. A few minor bugs crept in, however, and here are some examples:

The original photos of the Hindenburg indicated that the engine nacelles were of all metal construction. Later photos turned up by the Research Department showed that the upper rear portions of these were fabric over metal frameword. The original miniature nacelles were modified by cutting away these portions and substituting vacuum-formed plastic covers which were painted to simulate the fabric.

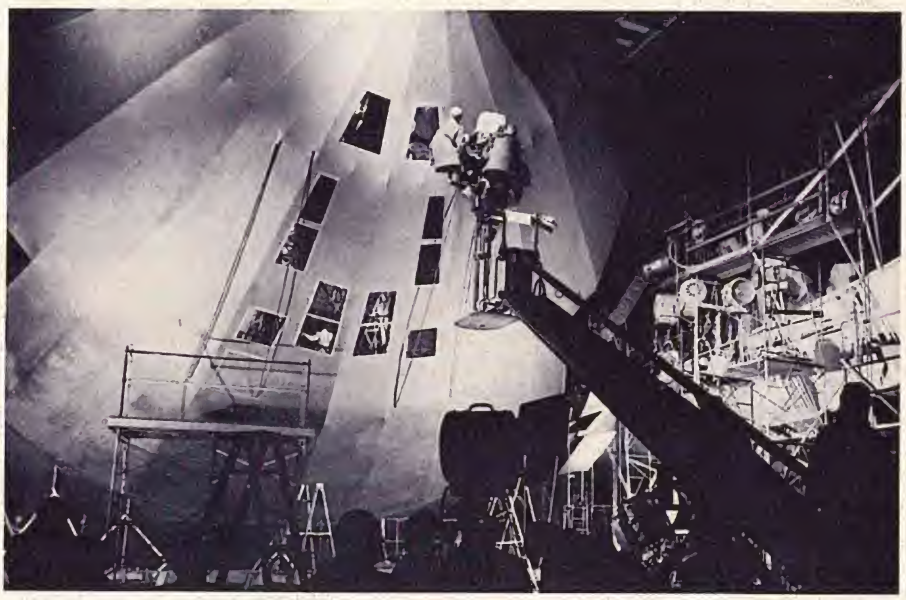
The Coverite was found to sag and wrinkle overnight due to the great change in termperature in the stage. This was easily remedied by application of localized heat with irons and heat guns. Some of the wrinkles were purposely left in at the Art Director's insistance, as they lend an air of realism to the miniature!

Servo chatter and dithering was noticed on the rudder and elevators when the first tests were made with all four engines running at full speed. This was traced to electrical noise originating from the ball bearings used to support the propeller shafts. Substitution of the bearings with non-metallic bushings quickly cured that problem.

The rudders and elevators were observed to "bounce" when control movement was started and stopped. The first thought was that the pushrods were flexing, but inspection showed that they were plenty stiff. The inertia of the moving surfaces was great enough to move the entire servo mount and surrounding framework! The cure was to wrap rubber bands around the rudder and elevator pivot tubes and anchor the bands to some nearby framework. This put just enough drag on the surfaces to stop the excess motion, and the strong servos were able to overcome the drag with ease.

It should be noted that with the exception

Photo of full-size pilot's gondola.



Setting up a shot of the full-size nose sections.

Bob Bell demonstrating 4 of the 5 Futaba R/C systems used on the Hindenburg.

The R/C Hindenburg passing overhead.

The Hindenburg entering a soundstage 'cloud.'

Hindenburg flies through cloud with only two rear engines operating.

of the single incident involving the prop bearings, the R/C systems performed perfectly throughout the project. No parts replacement, nor repairs of any kind were required at any time.

I was fortunate enough to have been on stage during some of the early test filming of the model, and was treated to a scene that some now-forgotten escort pilot may have witnessed nearly forty years ago over the North Atlantic. The stage was filled with artificial clouds from the floor to about eye-level, and a dark sky backdrop was in place about 30 feet behind the model. Somewhere in the murk, the Hindenburg rested on the floor, waiting for its turn to perform, while the lighting technicians, cameraman and crew fussed and fiddled around readying for the scene. At the Director's command of "Action," all became silent except for the gentle whirring of the electric motors.

Slowly the dark shape of the Hindenburg became evident, rising slowly through the clouds, its form outlined by the softly diffused glow of its running lights. As the giant airship neared the top of the cloud, more detail could be perceived, the lights in the passenger staterooms and lounge giving dimension to what was just moments before a vague silhouette. The nose broke through the cloud first, followed shortly by the whale-like fuselage and finally, by the upper rudder emblazoned with the brilliant red, white and black flag of the Third Reich.

The Hindenburg leveled off, its four propellers leaving swirls of mist in their wake, and continued across the horizon just above the clouds, its shimmering silver skin bathed in the light of the full moon.

"Cut and print it!" from the Director's bullhorn jarred me back to the present, and I stood for a moment, shrugging off the chill that had run up and down my spine. Then I chuckled to myself and walked out of the stage. I had stood there, no more than twenty feet away from the model I had watched take shape almost from the first crude sketch and my mind had totally accepted, if only for a moment, that the scene I had witnessed was **true**! This was the ultimate Scale modeler's fantasy!

When the movie "Hindenburg" is released in your area, I urge you to go out and see it, and join me in congratulating the Special Effects team at Universal on a magnificient job.

TECHNICAL DATA — R/C HINDENBURG

Length	25' 3"
Diameter	4' 2"
Weight	300 lbs.
Radio Type	Futaba Digital

RADIO CONTROLLED FUNCTIONS

Channels	Function
1	Rudders
1	Elevators
4	Engine Control
1	Passenger Doors/Boarding Ramps
2	Water Ballast (front and rear)
2	Mooring Lines (front and rear)
1	Radio Antennae
3	Freight Compartment Doors
4	Track Traverse and Tilt
9	Interior and Exterior Lighting □

RCM NEW ERA III

SPORT PATTERN AIRCRAFT

Technicol Art by: BILL BLAKE

don dewey's New Era III

FLIGHT TESTS BY CARL MAAS
PHOTOS BY
MARSHALL HOBART
BARBARA NORTON

● Several years ago, Chuck Cunningham and I developed a low wing, .15 powered aircraft which was designed to utilize the then new miniaturized radio equipment. Up until the introduction of the New Era I, small aircraft of this size had either exhibited squirrely flying characteristics, or too heavy a wing loading due to the heavier radio equipment we had used until the introduction of this smaller R/C system. Since that little ship eliminated both of these problems, and flew more like its larger cousins, we dubbed it the New Era I since it ushered in a new dimension in small plane performance. In the ensuing months and years, the New Era I became one of the top five most popular designs ever presented by R/C Modeler Magazine — even today it ranks in the top ten in plan sales month after month.

A year or two after the introduction of the New Era I, we incorporated the same design characteristics into a larger aircraft which was called the New Era II. This was powered by a .40 engine and, while of a larger physical size, exhibited all of the same flying characteristics of the smaller version. It grooved well, had an exceptionally slow landing speed, and performed most of the maneuvers with ease. All and all, both aircraft were excellent machines both from an ease of construction standpoint, their inherent ruggedness, and their overall performance as general sport aircraft.

However, during the past two years, we have been experimenting with the original design of the New Era I, changing airfoil sections, nose and tail moments, control surface areas, control surface throws, power loadings, wing loadings, and the like, attempting to come up with a vastly improved version of the original New Era I which would compete virtually in all respects with the .60 pattern ships. All prototypes utilized the .19 to .25 displacement engine for the economy both in engine size and fuel consumption. In addition, this size aircraft is far easier to transport and has the added plus of being able to be flown in a somewhat smaller area than the screaming .60 fuel guzzlers. Two engines were chosen around which this aircraft would be designed — the extremely powerful Veco-Lee .19 engine with Perry carburetor and the extremely quiet Veco muffler, and the equally powerful OS Max .25 engine and muffler. Both of these little powerplants have an extremely high power output with exceptional idling characteristics. The OS Max .25 and its muffler are available in virtually all hobby shops. The Veco-Lee .19 is available for $57.00 from Clarence Lee, 7215 Foothill Blvd., Tujunga, California 91042.

During the design stages of the New Era III, several people were involved. I began by noting the characteristics of the New Era I which we wished to retain in the new design, while Bill O'Brien added a list of changes which he felt would improve the overall flying characteristics. As the design progressed to the first flying prototypes, Carl Mass, an extremely proficient flier, tested the prototyes and made several changes to the evolving design.

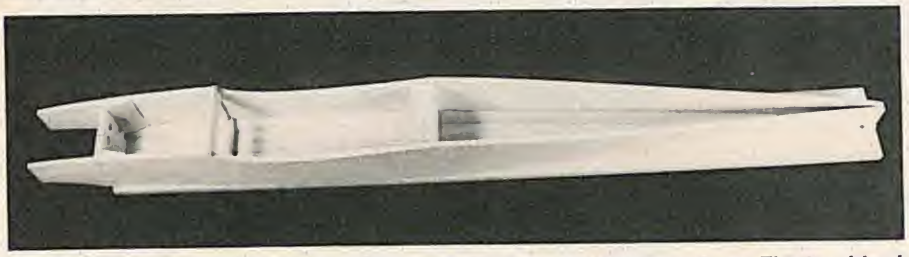
The finalized design of the New Era III was achieved after two years of experimentation and test flying. As you can see from the fuselage outline, the nose and tail moments have been lengthened over the original New Era I, the airfoil has been changed and, for those of you who would care to check it out, this is the same airfoil used on the Acro-Star biplane. It not only greatly improved the flying capabilities of

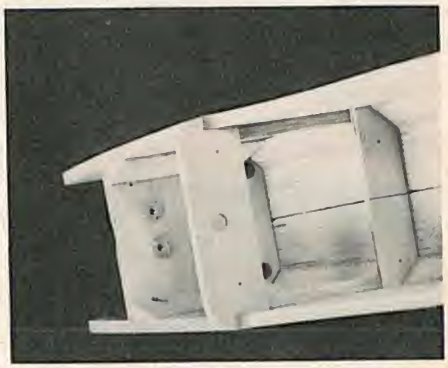
RCM NEW ERA III
Designed By: Don Dewey

TYPE AIRCRAFT
Sport-Pattern
WINGSPAN
44.6 Inches
WING CHORD
9⅛ Inches
TOTAL WING AREA
400 Square Inches
WING LOCATION
Low Wing
AIRFOIL
NACA 2412 Modified
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1/2 Inch
O.A. FUSELAGE LENGTH
39 Inches
RADIO COMPARTMENT AREA
(L) 8⅛" X (W) 2½" X (H) 3"
STABILIZER SPAN
19 Inches
STABILIZER CHORD (incl. elev.)
5.3 Inches (Average)
STABILIZER AREA
100 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
5½ Inches
VERTICAL FIN WIDTH (incl. rudder)
7 Inches Maximum
REC. ENGINE SIZE
.19-.25 Cubic Inch
FUEL TANK SIZE
4 Ounces
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
Four
CONTROL FUNCTIONS
Rudder, Elev., Ailerons, Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, and Ply
Wing ..... Balsa, Spruce and Ply
Empennage ..... Balsa
Weight Ready-To-Fly ..... 48-56 Ounces
Wing Loading ..... 18 Oz./Sq. Ft.

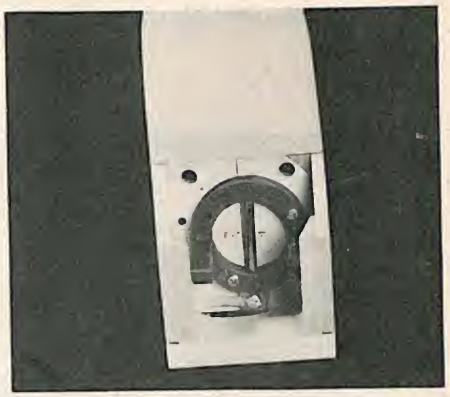
PLANS, TEXT, AND
CONSTRUCTION PROTOTYPES BY
LEE RENAUD
CUTAWAY BY BILL BLAKE

Construction begins by gluing formers and corner strips to top block.

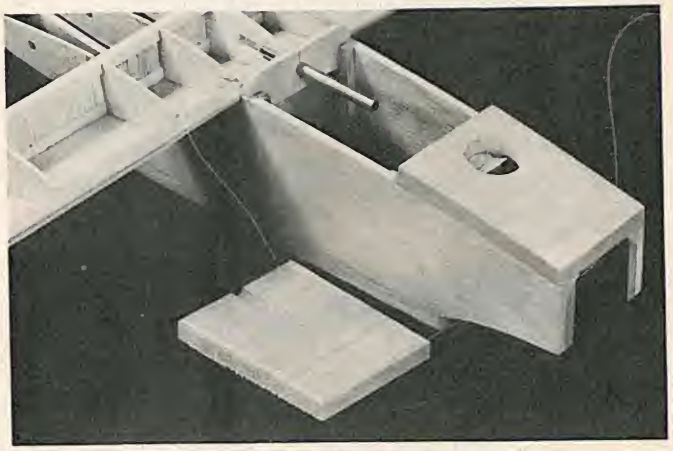




ABOVE: Fuselage sides are in place and ready for the bottom sheet. The top block has not been trimmed yet. RIGHT: Close-up of firewall and Former 2B.



ABOVE: Ready for chin sheet. Aft bottom sheet installed and top block trimmed. RIGHT: Engine mount installed and nose trimmer for spinner ring. Tiller bar below mount.



Forward chin sheet in place. Note how nose gear coil fits inside hole.

Using brass tube to drill hole in wing L.E. for hold-down dowel.

the New Era III, but the slow landing characteristics were still retained. You will also notice that the ailerons are slightly thicker than the trailing edge of the wing which, if you'll go back a few issues in RCM, will explain to you why the aileron efficiency of the New Era III is so great and will also explain its rapid, but precise, roll rate.

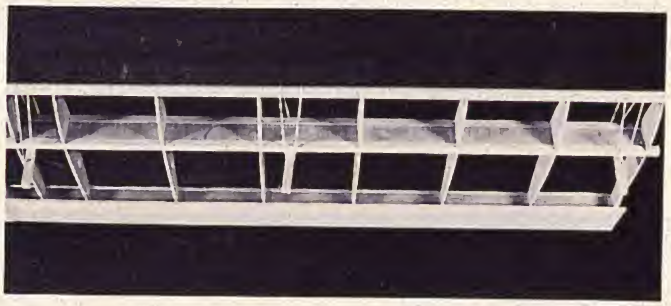
You will find that the wing construction has been completely changed from the original New Era I which has increased its rigidity by utilizing shear webs to lock the D-tube construction and add fantastic torsional stiffness. The fuselage is quite simple and utilizes no doublers but a more rounded top deck for overall appearance. The nose is roomy and the engine can be mounted upright for convenience with a sidewinder mount optional for overall appearance if you prefer.

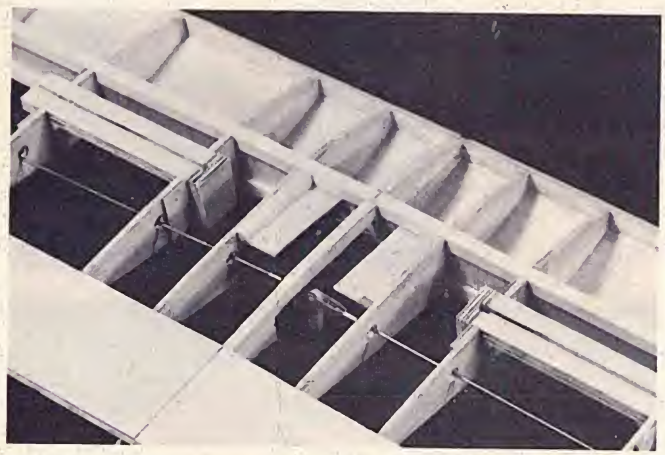
With regards to the final prototypes, and their flight performance, I can only say that we have never, in all the ships we have

Nose ring in place and fuselage contours shaped.

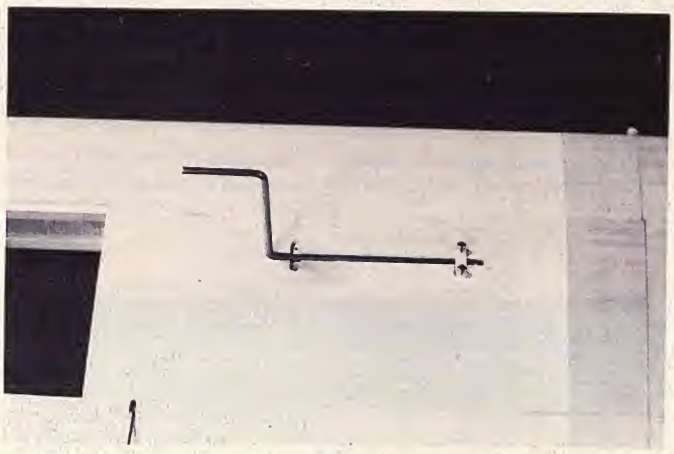
Detail of chin area after shaping. Note how 3/8" triangle seals tank compartment.

ABOVE: Fuselage complete and ready for tail feathers. RIGHT: Method of installing L.E. with rubber bands.





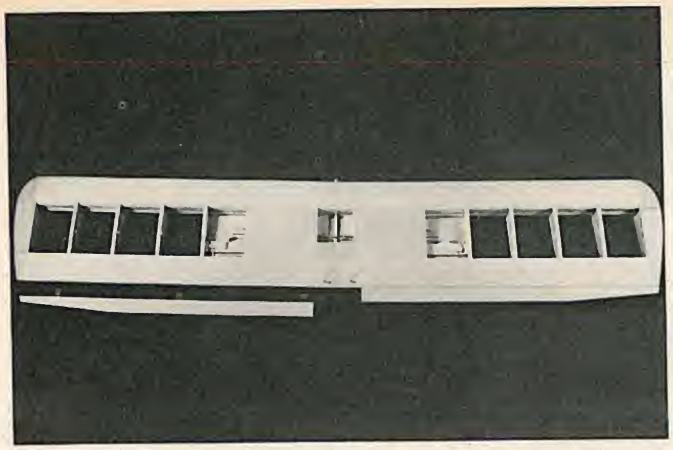
Center section before installing bottom sheet. Aileron servo and pushrods in place.



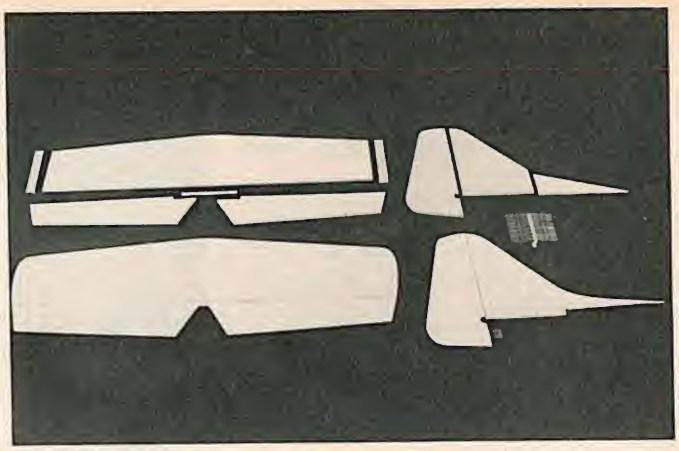
Main gear in place. Note slots in sheeting for gear and retainers, as well as aileron link.

Detail of aileron servo compartment. Du-Bro solder links connect ailerons to servo arm.

Aileron bellcrank. Note that link to horn is installed in middle hole.



Completed wing ready for covering.



Tail surfaces before and after shaping and assembly.

tested and flown, found a ship of comparable size and power that could equal the New Era III. Carl Maas, during the final test flights stated quite simply that it could equal almost any .60 powered competition stunt aircraft that he had seen or flown. In fact, the local fliers watching Carl put the New Era III through its paces, were waiting in line to take their turn at the stick. Each of them agreed that this .19 to .25 powered ship was the equivalent to their .60 powered pattern aircraft, and each of them asked for a set of the plans.

If you decide to build the New Era III, and we hope you will for it will truly amaze you with its spectacular performance, I hope you will keep in mind that this is definitely not a beginners aircraft. Although capable of sustained low speed flight, it is an extremely fast ship requiring the reflexes of a trained R/C pilot. This machine **grooves** — it goes exactly where you point it and will do each and every maneuver that you call upon it to perform from sustained knife edge flight to vertical maneuvers of any type. Yet, you can slow it down, and drag it in nose high at a landing rate so slow that you will find it almost impossible to believe that it is still airborne. I strongly recommend that you set it up with minimum throws on the control surfaces (particularly the ailerons) until you have completed the first few trim flights. If you don't and have excessive control surface movement, you are going to be doing square vertical eights and consecutive axial rolls faster than you can count them!

Since I don't draw plans during the design of an aircraft due to the fact that, if I did, no one, including Dick Kidd, could decipher the hen scratches, and, following the excitement generated by the New Era III in the Southern California area, Lee Renaud built three additional prototypes for the series of construction photographs which accompany this article and drew the plans and wrote the construction notes which follow. For those of you who would prefer building from a kit than from plans, the New Era III will be kitted by Airtronics in the near future and available at your local hobby shops. However, if you are a scratch builder and want to be the first kid on the block to have a .19 to .25 powered aircraft that can fly circles around the big fuel gulpers, order the plans for the New Era III from RCM's Plan Service and let's get started on the construction. At this point, we'll turn the article over to Lee Renaud for his construction notes:

PREPARATION:

Pre-cut all parts to make a personalized custom kit before starting construction. The wing leading edges are most easily cut on a table saw, but can be shaped from 1/4'' x 3/8'' stock. The landing gear trunnions can be laminated from strips of 1/8'' ply if you can't dado the slots in the 1/4'' ply as specified on the plans.

The wing ribs are cut by stacking 1⅜'' x 8'' balsa rectangles between two ply templates and carving to outline. Sand flush with the surface of the template, notch for the spars, and drill the 1/4'' diameter hole while the ribs are stacked. Cut the shear webs from 3/32'' sheet trimmed 2-24/32'' wide. Cut the empennage from medium 3/16'' balsa sheet, using 4'' stock if possible. The fuselage sides should be medium weight straight grained sheet as well matched as you can find. The top block is light to medium balsa. Lay out a centerline on the block and cut the 3/16'' wide slot for the fin aligning the slot carefully. Lay out the former locations using the plan as a guide and draw lines across the inside surface. Cut the firewall and other formers to shape and you are ready to start.

CONSTRUCTION:

This model is definitely not for the beginner so the following instructions highlight the assembly sequence without detailing all techniques. Most of you who will build the New Era III have very definite building habits so if you don't like it our way try your own approach. This is a very simple ship to build and only one or two steps are critical in sequence.

Our prototypes were built with Hot-Stuff, 5-minute epoxy, Hobbypoxy I, contact cement, and a little bit of Wilhold. Use any or all of these adhesives as you prefer. A good straight building surface at least 8'' wide and 45'' long is a must. Grab the pins, masking tape, Handi-wrap, or waxed paper, clear the debris off your bench, and let's get started!

WING:

We used a hinged plywood board so that both panels could be built at the same time. The RCM Wing Jig can also be used by drilling holes in the ribs for the rods and setting the jig up for the proper dihedral angle. There is 1/2'' dihedral under each tip so set your board or jig up accordingly. If you don't have a hinged board or jig, then build one panel flat and when it's dry, prop the tip up 1'' and build the second panel on the first panel.

1) Check that the trailing edge sheet edge is straight and trim the back edge with a straight-edge, if necessary. Pin the sheet in position, butting the center joint tightly.

2) Place scrap 1/4'' square jig blocks under the bottom spar and install the tip rib and first rib near center. Use the rib notches to locate the spar. Note that the aft edge of the rib is inset 1/8'' from the trailing edge.

3) Install the rest of the ribs and shear webs working inboard from the tip. Use the shear webs as spacers to align the ribs and hold them perpendicularly. Check that the bellcrank mount fits properly between the ribs but don't install yet. Be sure that the top of the webs are flush or slightly below the bottom of the spar notch. Trim the center webs to size and finish installing all ribs. Cut out the 3/16'' center rib to suit your servo and install. Add the 1/4'' x 1'' T.E. stock fillers.

4) Install the top spar gluing securely to the top of the shear webs. Check that the spar is flush with the top of the ribs and that the bottom spar is resting on the 1/4'' square shims.

5) Apply Hobbypoxy Formula I to the aft edge of the top trailing edge sheet and to the rib surface in contact with the sheet. Place sheet in position and use a 1/4'' x 1/2'' or similar strip as a pressure strip at the trailing

edge. Pin through the strip and sheet into the work surface. This will provide a dead straight trailing edge. Don't use water soluble glues for this joint as they will cause curling or warping. Use weights or pins to hold the front edge of the sheet firmly against the ribs.

6) Apply glue to the front end of all ribs and install the leading edge. Use rubber bands looped over 2''-3'' lengths of 1/4'' square scrap placed behind the spars to secure the leading edge while drying. Remove the bands when dry.

7) Install the top leading edge sheet starting at the spar and working toward the leading edge. We prefer to use contact cement to install this sheet as it eliminates pins and drying time. When the glue has dried you can remove the wing from the work surface.

At this point we suggest that you lay the wing aside and begin fuselage construction. This will permit installation of the forward hold-down dowel before the bottom wing sheet is applied.

FUSELAGE:

1) Lay out and drill all holes in the 1/4'' plywood firewall, F-1. The throttle pushrod location shown on the plans is correct for the Veco .19 but may be shifted to suit the particular engine you select. Scoop a 1/16'' deep recess in the forward face of the firewall under the engine mount to clear the boss on the tiller arm. Install the #4-40 blind nuts on the aft face and epoxy in place. the aft face and epoxy in place.

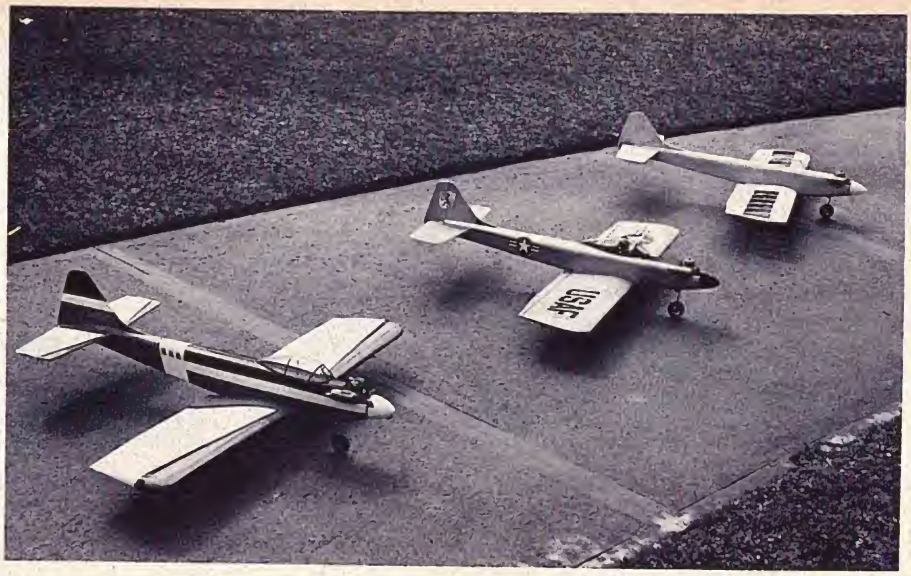
2) Pin the 3/8'' sheet top to your work surface. Draw a vertical centerline on F-1, F-2A and F-3 and glue the formers in position aligning the center lines carefully and using a small square or triangle to check that they are square. **NOTE:** Be sure that the firewall is angled to provide the proper right thrust offset.

3) Apply glue to one edge of the 3/8'' triangular stock top longerons and glue to the top block. Use pins to hold in position and check that the outer edge is aligned with the edge of the formers. Let dry thoroughly.

4) Taper the inner face of the sides where they come together at the tail to provide increased gluing surface. Apply glue to the edges of the formers and triangle stock and to the top edge of the sides and install both sides. Use pins and/or masking tape to hold sides tightly against the formers and to hold the tailpost together.

5) Install the 3/16'' x 1/4'' verticals forward of F-2A and epoxy F-2B in place. Add the 1/4'' x 1'' T.E. stock reinforcements behind F-1. Epoxy the 1/4'' ply aft hold-down plate to the face of F-3 and to the sides and add the 1/4'' triangular stock reinforcements. Install the 3/8'' triangular stock crosspiece behind F-1 and along the sides forward of F-1.

6) Remove any pins inside the fuselage between F-3 and the tail. Cut the aft bottom sheet from 3/32'' stock and install, starting at F-3 and working toward the tail. When this sheet has dried, the fuselage can be removed from the work surface and the top and bottom sheet trimmed flush with the sides.



Don Dewey's original OS .25 powered New Era III in foreground. Lee Renaud's Veco-Lee .19 prototype in center, ready-to-cover proto at rear.

7) Lay out the mounting holes for your engine on the mount, positioning the engine as far rearward as possible. Temporarily install the mount on the firewall and install the tiller arm and nosegear. Note that you will have to cut 1/4'' off of the end of the tiller arm and carve the triangle stock to clear the tiller arm and pushrod. Cut a 1'' diameter hole in the forward chin block sheet and drop over the nosegear strut. Check for proper clearance around the strut coils and epoxy forward chin sheet in place.

8) At this point, the forward wing hold-down should be installed. Sharpen the end of a piece of 1/4'' O.D. brass tubing to act as a drill and check the fit through the hole in the bulkhead F-2B. Carve and sand the wing leading edge in the center where it contacts the sides and position the wing on the fuselage. Hold the wing tightly in position making sure that the center joint is aligned with the hole in F-2B. Rotate the tubing through F-2B and drill through the wing leading edge. Check that the hole lines up with the slot in the center wing rib and temporarily install the 1/4'' diameter hold-down dowel. Check alignment again and set the wing aside while you finish the fuselage.

9) Mount a prop and the spinner on the engine and drop it into the mount. Mark and trim the sides so that there is a 3/32'' to 1/8'' gap between the spinner backplate and end of the sides. Cut the 1/16'' ply nose ring to shape and epoxy to the nose using the spinner to align the ring properly. Add the 1/4'' x 1'' T.E. stock reinforcements and the 3/32'' sheet fillers to the top edge of the engine compartment. Trim the top edge of the right side to clear the muffler, if necessary. Remove the engine and mount.

10) Mix a batch of Formula II

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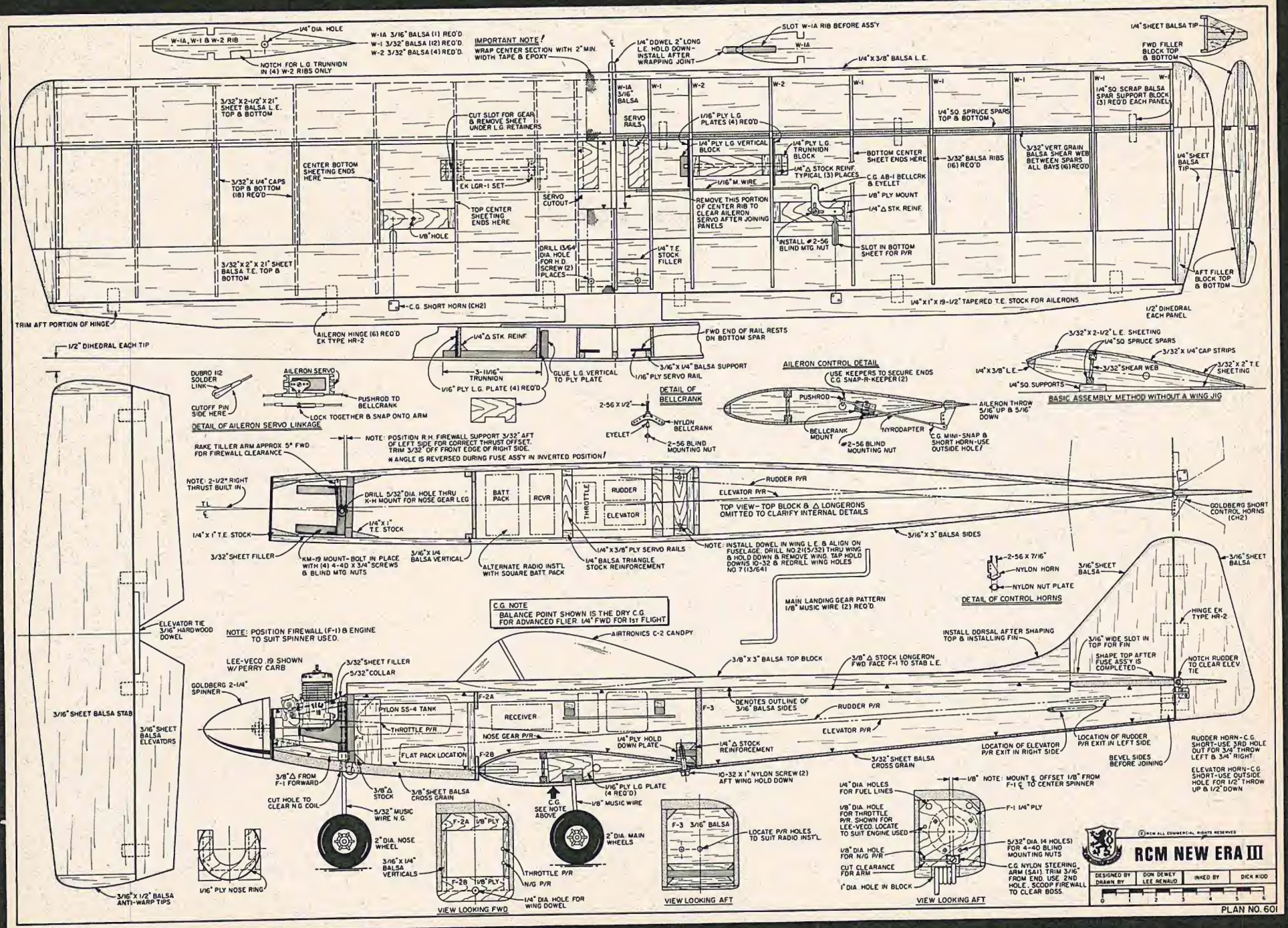
Carl Maas fires up original New Era III. This photograph, as well as color photos and inverted flight shot on page 50 taken at RC Bees field.


W-1A, W-1 & W-2 RIB
1/4" DIA. HOLE
NOTCH FOR L.G. TRUNNION IN (4) W-2 RIBS ONLY
W-1A 3/16" BALSA (1) REQ'D.
W-1 3/32" BALSA (12) REQ'D.
W-2 3/32" BALSA (4) REQ'D.
IMPORTANT NOTE!
WRAP CENTER SECTION WITH 2" MIN. WIDTH TAPE & EPOXY
1/4" DOWEL 2" LONG L.E. HOLD DOWN - INSTALL AFTER WRAPPING JOINT
SLOT W-1A RIB BEFORE ASS'Y
1/4" X 3/8" BALSA L.E.
1/4" SHEET BALSA TIP
FWD FILLER BLOCK TOP & BOTTOM
1/4" SQ. SCRAP BALSA SPAR SUPPORT BLOCK (3) REQ'D EACH PANEL
3/32" X 2-1/2" X 21" SHEET BALSA L.E. TOP & BOTTOM
CUT SLOT FOR GEAR & REMOVE SHEET UNDER L.G. RETAINERS
SERVO RAILS
1/16" PLY L.G. PLATES (4) REQ'D
1/4" SQ. SPRUCE SPARS TOP & BOTTOM
3/32" VERT. GRAIN BALSA SHEAR WEB BETWEEN SPARS ALL BAYS (16) REQ'D
1/4" SHEET BALSA TIP
CENTER BOTTOM SHEETING ENDS HERE
1/4" PLY L.G. VERTICAL BLOCK
1/4" PLY L.G. TRUNNION BLOCK
BOTTOM CENTER SHEET ENDS HERE
3/32" BALSA RIBS (16) REQ'D
3/32" X 1/4" CAPS TOP & BOTTOM (18) REQ'D
EK LGR-1 SET
1/4" △ STOCK REINF. TYPICAL (3) PLACES
C.G. AB-1 BELLCRK & EYELET
1/16" M. WIRE
1/8" PLY MOUNT
TOP CENTER SHEETING ENDS HERE
SERVO CUTOUT
REMOVE THIS PORTION OF CENTER RIB TO CLEAR AILERON SERVO AFTER JOINING PANELS
1/4" △ STK. REINF.
1/8" HOLE
INSTALL #2-56 BLIND MTG NUT
SLOT IN BOTTOM SHEET FOR P/R
DRILL (3/64 DIA. HOLE FOR W.D. SCREW (2) PLACES
1/4" T.E. STOCK FILLER
3/32" X 2" X 21" SHEET BALSA T.E. TOP & BOTTOM
AFT FILLER BLOCK TOP & BOTTOM
C.G. SHORT HORN (CH2)
1/8" X 1" X 19-1/2" TAPERED T.E. STOCK FOR AILERONS
1/2" DIHEDRAL EACH PANEL
TRIM AFT PORTION OF HINGE
AILERON HINGE (6) REQ'D EK TYPE HR-2
1/2" DIHEDRAL EACH TIP
FWD END OF RAIL RESTS ON BOTTOM SPAR
1/4" △ STK. REINF.
3-11/16" TRUNNION
GLUE L.G. VERTICAL TO PLY PLATE
3/16" X 1/4" BALSA SUPPORT
1/16" PLY SERVO RAIL
1/16" PLY L.G. PLATE (4) REQ'D
AILERON CONTROL DETAIL
USE KEEPERS TO SECURE ENDS C.G. SNAP-R-KEEPER (2)
PUSHROD
AILERON THROW 5/16" UP & 5/16" DOWN
BELLCRANK MOUNT
NYRODAPTER
C.G. MINI-SNAP & SHORT HORN-USE OUTSIDE HOLE
#2-56 BLIND MOUNTING NUT
3/32" X 2-1/2" L.E. SHEETING
1/4" SQ. SPRUCE SPARS
3/32" X 1/4" CAP STRIPS
1/4" X 3/8" L.E.
3/32" SHEAR WEB
3/32" X 2" T.E. SHEETING
1/4" SQ. SUPPORTS
BASIC ASSEMBLY METHOD WITHOUT A WING JIG
DUBRO 112 SOLDER LINK
CUTOFF PIN SIDE HERE
AILERON SERVO
PUSHROD TO BELLCRANK
LOCK TOGETHER & SNAP ONTO ARM
DETAIL OF AILERON SERVO LINKAGE
DETAIL OF BELLCRANK
2-56 X 1/2"
NYLON BELLCRANK
EYELET
2-56 BLIND MOUNTING NUT
RAKE TILLER ARM APPROX. 5° FWD FOR FIREWALL CLEARANCE
NOTE: POSITION R.H. FIREWALL SUPPORT 3/32" AFT OF LEFT SIDE FOR CORRECT THRUST OFFSET. TRIM 3/32" OFF FRONT EDGE OF RIGHT SIDE.
* ANGLE IS REVERSED DURING FUSE ASSY IN INVERTED POSITION!
NOTE: 2-1/2° RIGHT THRUST BUILT IN
DRILL 5/32" DIA. HOLE THRU K-H MOUNT FOR NOSE GEAR LEG
BATT PACK
RCVR
THROTTLE
RUDDER
ELEVATOR
RUDDER P/R
ELEVATOR P/R
TOP VIEW - TOP BLOCK & △ LONGERONS OMITTED TO CLARIFY INTERNAL DETAILS
GOLDBERG SHORT CONTROL HORNS (CH2)
1/4" X 1" T.E. STOCK
1/4" X 1" T.E. STOCK
3/32" SHEET FILLER
KM-19 MOUNT - BOLT IN PLACE WITH (4) 4-40 X 3/4" SCREWS & BLIND MTG. NUTS
3/16" X 1/4 BALSA VERTICAL
ALTERNATE RADIO INST'L WITH SQUARE BATT PACK
1/4" X 3/8" PLY SERVO RAILS
1/4" BALSA TRIANGLE STOCK REINFORCEMENT
3/16" X 3" BALSA SIDES
NOTE: INSTALL DOWEL IN WING L.E. & ALIGN ON FUSELAGE. DRILL NO.21(5/32) THRU WING & HOLD DOWN & REMOVE WING. TAP HOLD DOWNS 10-32 & REDRILL WING HOLES NO.7 (13/64)
2-56 X 7/16"
NYLON HORN
NYLON NUT PLATE
DETAIL OF CONTROL HORNS
3/16" SHEET BALSA
3/16" SHEET BALSA
MAIN LANDING GEAR PATTERN 1/8" MUSIC WIRE (2) REQ'D.
C.G. NOTE
BALANCE POINT SHOWN IS THE DRY C.G. FOR ADVANCED FLIER. 1/4" FWD FOR 1ST FLIGHT
AIRTRONICS C-2 CANOPY
INSTALL DORSAL AFTER SHAPING TOP & INSTALLING FIN
HINGE EK TYPE HR-2
3/16" WIDE SLOT IN TOP FOR FIN
SHAPE TOP AFTER FUSE ASS'Y IS COMPLETED
NOTCH RUDDER TO CLEAR ELEV. TIE
ELEVATOR TIE 3/16" HARDWOOD DOWEL
NOTE: POSITION FIREWALL (F-1) & ENGINE TO SUIT SPINNER USED.
LEE-VECO .19 SHOWN W/PERRY CARB
3/32" SHEET FILLER
5/32" COLLAR
3/8" X 3" BALSA TOP BLOCK
3/8" △ STOCK LONGERON FWD FACE F-1 TO STAB L.E.
GOLDBERG 2-1/4" SPINNER
F-2A
F-3
F-2B
PYLON SS-4 TANK
RECEIVER
THROTTLE P/R
NOSE GEAR P/R
FLAT PACK LOCATION
DENOTES OUTLINE OF 3/16" BALSA SIDES
RUDDER P/R
ELEVATOR P/R
1/4" PLY HOLD DOWN PLATE
1/4" △ STOCK REINFORCEMENT
3/32" SHEET BALSA CROSS GRAIN
LOCATION OF ELEVATOR P/R EXIT IN RIGHT SIDE
LOCATION OF RUDDER P/R EXIT IN LEFT SIDE
BEVEL SIDES BEFORE JOINING
RUDDER HORN - C.G. SHORT-USE 3RD HOLE OUT FOR 3/4" THROW LEFT & 3/4" RIGHT
ELEVATOR HORN - C.G. SHORT-USE OUTSIDE HOLE FOR 1/2" THROW UP & 1/2" DOWN
3/16" SHEET BALSA STAB
3/16" SHEET BALSA ELEVATORS
3/8" △ FROM F-1 FORWARD
3/8" △ STOCK
3/8" SHEET BALSA CROSS GRAIN
10-32 X 1" NYLON SCREW (2) AFT WING HOLD DOWN
1/16" PLY L.G. PLATE (4 REQ'D)
1/8" MUSIC WIRE
CUT HOLE TO CLEAR N.G. COIL
5/32" MUSIC WIRE N.G.
C.G. SEE NOTE ABOVE
2" DIA. MAIN WHEELS
2" DIA. NOSE WHEEL
3/16" X 1/4" BALSA VERTICALS
1/16" PLY NOSE RING
3/16" X 1/2" BALSA ANTI-WARP TIPS
F-2A 1/8" PLY
F-2B 1/8" PLY
THROTTLE P/R
N/G P/R
1/4" DIA. HOLE FOR WING DOWEL
VIEW LOOKING FWD
F-3 3/16" BALSA
LOCATE P/R HOLES TO SUIT RADIO INST'L.
VIEW LOOKING AFT
1/4" DIA. HOLES FOR FUEL LINES
1/8" DIA. HOLE FOR THROTTLE P/R. SHOWN FOR LEE-VECO. LOCATE TO SUIT ENGINE USED
1/8" DIA. HOLE FOR N/G P/R
CUT CLEARANCE FOR ARM
1" DIA. HOLE IN BLOCK
1/8" NOTE: MOUNT & OFFSET 1/8" FROM F-1 ℄ TO CENTER SPINNER
F-1 1/4" PLY
5/32" DIA. (4 HOLES) FOR 4-40 BLIND MOUNTING NUTS
C.G. NYLON STEERING ARM (SAII). TRIM 3/16 FROM END. USE 2ND HOLE. SCOOP FIREWALL TO CLEAR BDSS.
VIEW LOOKING AFT
©RCM ALL COMMERCIAL RIGHTS RESERVED
RCM NEW ERA III
DESIGNED BY DRAWN BY
DON DEWEY LEE RENAUD
INKED BY
DICK KIDD
0 1 2 3 4 5 6
PLAN NO. 601

NOSTALGIA IN YELLOW

For a change of pace, try this magnificent 1932 Ford V-8 coupe, modified for R C by Larry Atkinson, a soaring and hydroplane enthusiast.
Photos and text by Don Condon.

Do you remember when a new car like this cost about $600.00? How about when gas for this same car cost about 15 cents a gallon? If you do, your age is showing, and I should know because I can remember!

The car I am talking about in the photos is a Monogram Kit of the 1932 Ford V-8 Coupe, in 1/8th scale. The car was built and put into R/C form by Larry Atkinson, of Beloit, Wisconsin 53511.

Larry is 48 years old, (his age is showing, too, because he remembers the real one, too.) He is a machine shop assembly inspector, and has been in R/C for 18 years. His prime interest is competition hydroplanes, but he flies gliders, too.

The photos will show you everything necessary for building your own model, and I will explain a few of the main points on the drive train and steering.

The radio can be any 2 channel or more, for forward and reverse, plus right and left steering. The model has working head and tail lights, on a separate battery pack, with the pack in the car's gas tank, under the trunk. Two screws detach the tank cover and the switch is cut into the bottom of the tank. Grain of wheat bulbs are used for lights.

The motor switch is a homemade slide switch, but Larry claims a double pole double throw micro switch would be better, or alternately, a small pot for speed control.

Power is supplied by a Pittman Model #9003, 3 to 6 volt motor, on 2.4 amps maximum. A fuse ahead of the motor protects this load. The special pulleys on the motor and drive shaft were turned on the lathe, for a 3-to-1 power ratio, with four O-rings for belts. Any kind of small pulleys would be okay and one belt would probably do the job. Larry just likes to make metal shavings.

The drive shaft housing is 3/8'' I.D. brass tube. 3/8'' O.D. slot car ball bearings on each end support the 1/8'' brass rod drive shaft. A pinion gear on the end of the drive shaft was scrounged from an old alarm clock. What's the gear ratio, you say? Who knows (or cares). It works and you don't have to make it. Actually, slot car pinions might work too, or perhaps some from R/C race car suppliers would be suitable.

The rear axle housing is 3/8'' I.D. brass tube with a 3/8'' O.D. slot car ball bearing and 1/8'' brass rod axles. The ring gear for the axle drive comes with the motorized version of the kit, and drives only one rear wheel.

The front axle is 1/8'' I.D. brass tube with a 3/16'' I.D. joint in the center, with brass tabs soldered to the joint, and bolted to the plastic frame. The yoke is of 1/16'' brass strip. The king pin housing is 1/8'' I.D. brass tube with a 1/8'' brass rod for the king pin, the ends of which are mounted in the yoke. The axle to mount the front wheels is 1/8'' brass rod, soldered into the sides of the king pin housing. Steering parts on the front wheels are 1/16'' brass strip with bicycle

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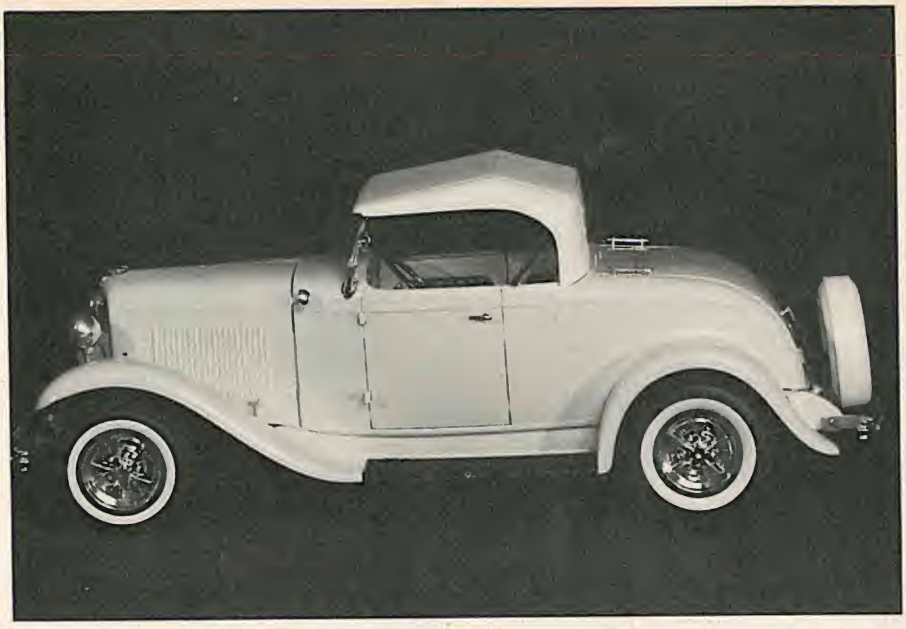
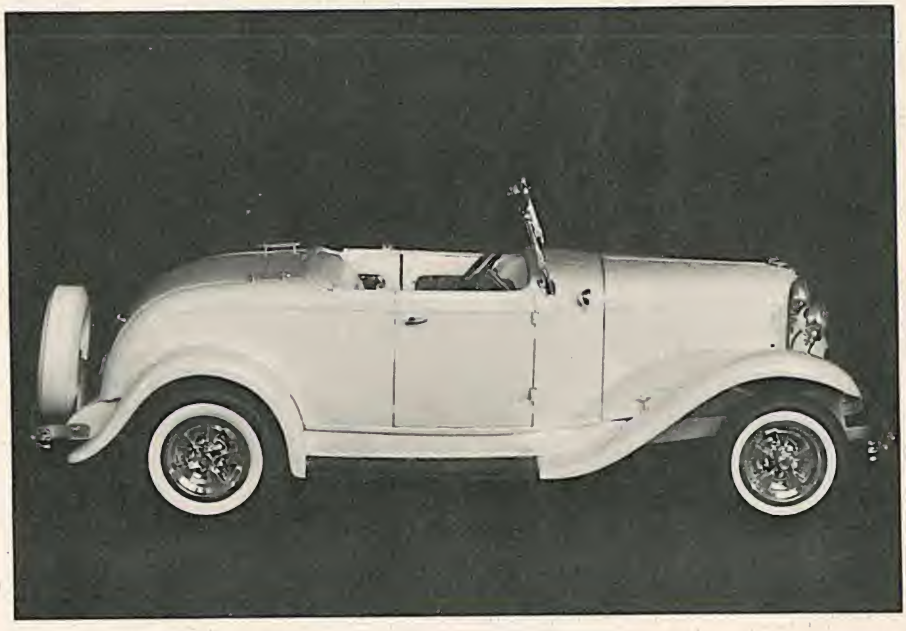
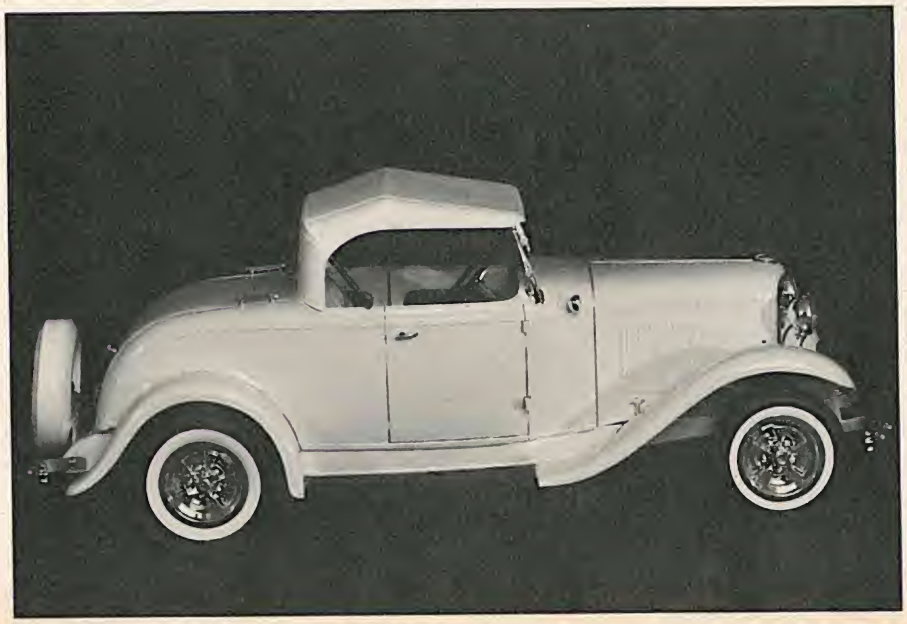
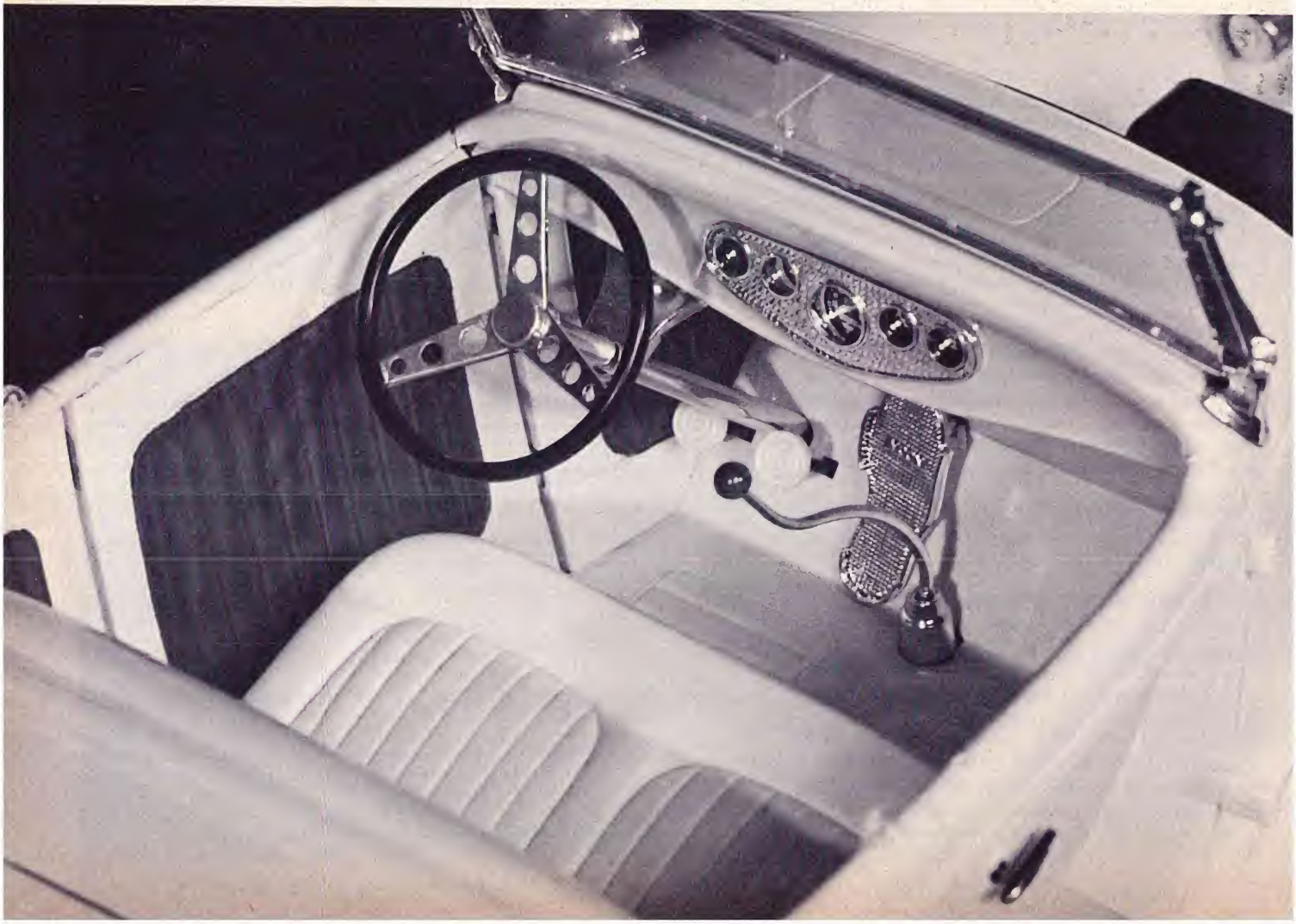
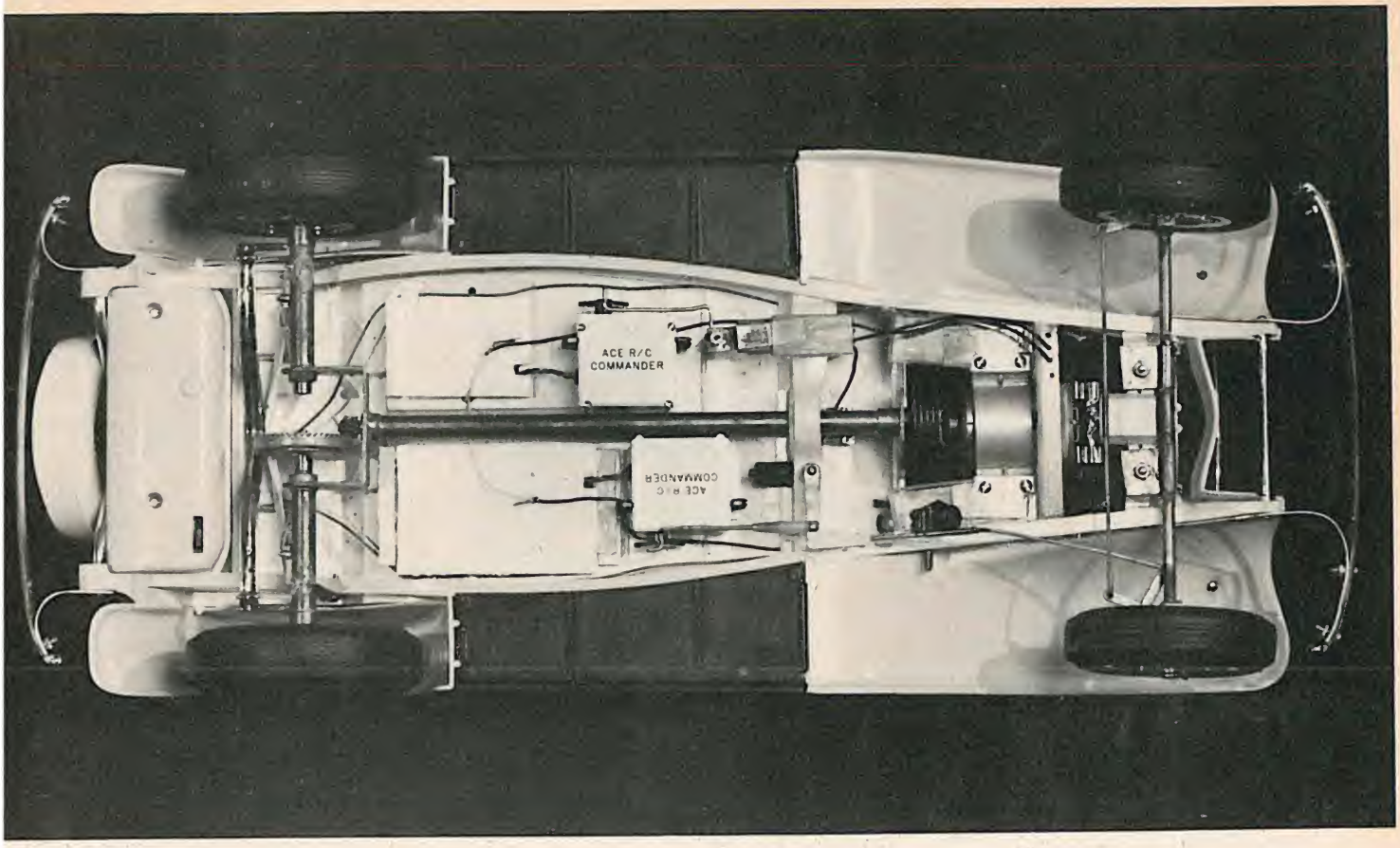
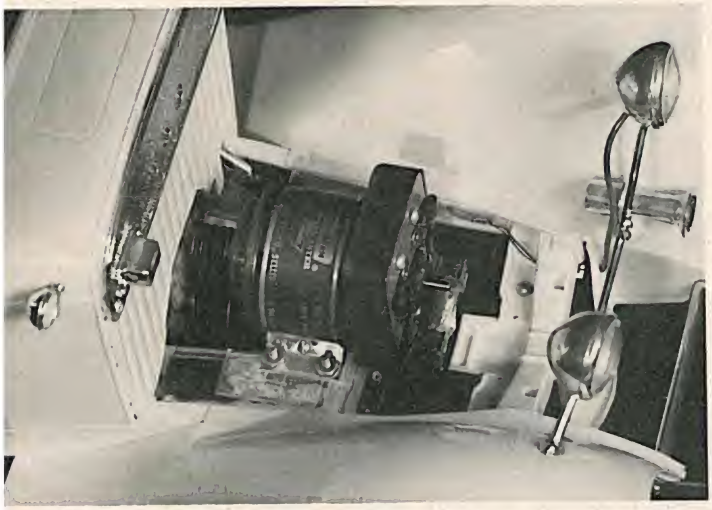


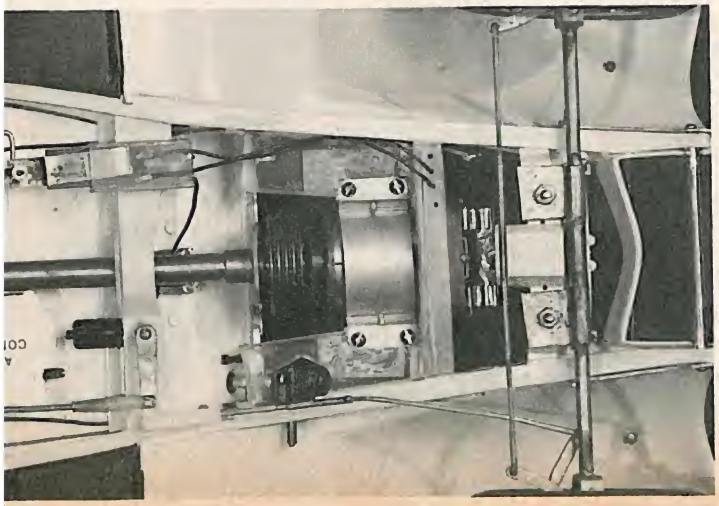


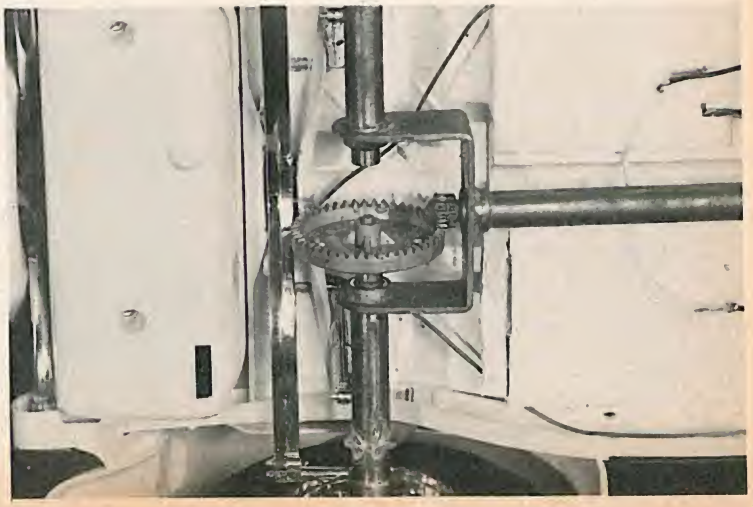





ACE R/C
COMMANDER







Dick Beltz Models Pokey 808.

SOARING

BY JIM SIMPSON

● This months soaring discussion will continue along the line developed two months ago wherein we compare the two distinctly different philosophies of flight. Last month we touched briefly on the problem of knowing when we are in a thermal as we fly a large, heavy, fast sailplane as opposed to the slow and light jobs. Now, let's consider when to choose **which** plane and **why.**

Suppose you enter a contest for R/C sailplanes wherein the tasks are 2 or 3 minute precision, speed and 15 minute "add-em-up." It is possible to win such a contest with a maximum flight time of 5 minutes. So, on a dead calm day the light slow airplanes will have no trouble making 5 minutes with no lift if they are trimmed for flight properly. On the other hand you might be better advised to choose a heavier wing loading for the speed event and take your chance on the "add-em-up." The point being that, with three chances and the fast plane, you should be able to hook one maximum flight (7 minutes) so the other flight average need be only 4 minutes each. If your plane won't make 4 minutes in dead air you need to trim it out better or junk it!

For a second example, suppose you enter a thermal duration contest wherein 10 min. flights are necessary or, perhaps, you fly dual elimination where the object is to stay airborne longer than the other guy who launched at the exact same time. If the wind is calm you would be tempted to go with the light slow job and work every little "bump" for all it's worth. In the same condition the fast heavies must find a thermal, get in and ride (if possible) then chances are good they might need to find another (which they do better by virtue of their faster speed). Suppose, for the sake of discussion, that it is a windy day when maximum duration is the objective. Certainly the fast heavies are going to have a penetration advantage. As a personal observation I guarantee you that, occasionally, I have seen conditions in the midwest where the light slow sailplanes could not make it back to the field to land.

Before you jump the gun and conclude that only this or that kind is best, let's consider some other variables. Wing loading is something we've bandied about for some time. The key here is that if you have a light, slow plane it can be adjusted into the fast heavy bracket with the simple addition of ballast (dead weight on the Center of Gravity). Sounds almost too simple doesn't it? Before you bust up your favorite wing, let me caution you to experiment by adding only 2 ounces at a time and carefully note the effect. That way you can do a lot more flying before you break the wing!

While we're on wings, have you considered variable airfoils? Like Fords and Chevys, or Democrats and Republicans, there are flat bottomed and undercambered airfoils. And, you know what? The advocate of a flat bottom can give exactly the same number of "scientific" reasons for having one as the Ford sales man can give you for buying a Ford. So, you might want to buy a Plymouth, vote independent, and try a variable airfoil (where the last 20-25% of the wing is hinged and controllable). Remember, however, that if you don't do well you can only blame yourself!

Finally, we are left with the releaseable towhook because we've discussed spoilers/airbrakes in previous issues. The releaseable towhook is most often overlooked in the search for maximum flexibility but I guarantee you that if you are flying off a Hi-Start in a 2 minute precision event it sure beats trying to adjust altitude by pounds of pull! So far as we know the only releaseable towhook commercially available is the EK Products, Inc. version (THR-1) available at your dealers.

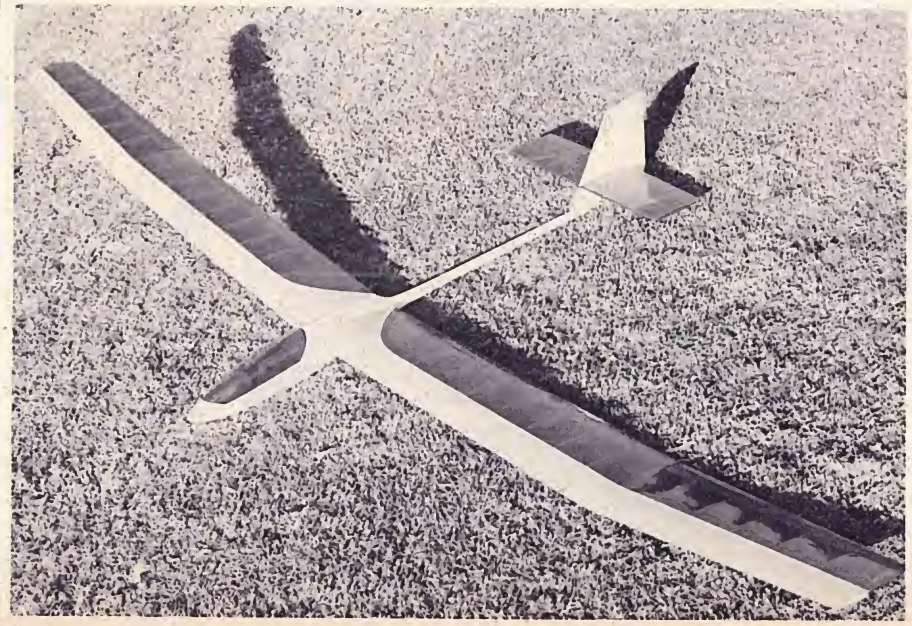
Well, what's the point of points of all this month's discussion, anyway? They are as follows:

(1) All things being equal, the pilot who knows his plane best will have more chance of winning.

(2) There still doesn't seem to be a single clearly superior R/C sailplane capable of all flight regimens. In lieu of this you have two alternatives:
   a. build a light, slow plane that can be
   b. build a heavy, fast plane which is more tolerant of **all** weather conditions.

(3) If you attempt to employ **all** gadgetry available and fail to win as a result — you can blame only yourself for not

Montrose Hobbies Standard Class Albatross



combining it all properly.

Next month we will begin to examine flying technique in detail.

SOARING HINTS AND KINKS

For mounting servos in gliders, where the tape does not stick well to bare balsa, a quick coat of contact cement such as used for covering foam wings, on the balsa area will allow a very strong bond to be formed. This idea was submitted by Dick Roddy of Houston, Texas.

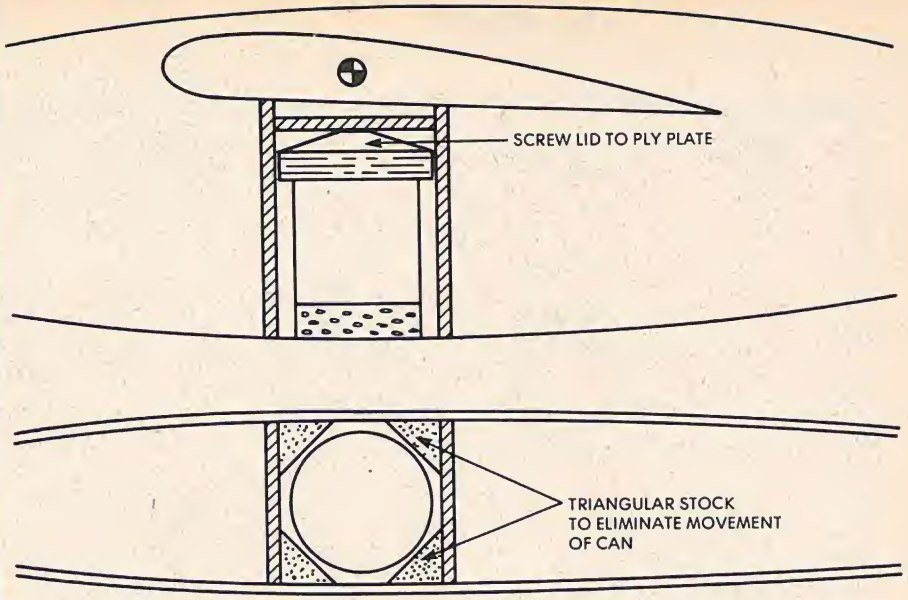
Rick Downs of Coweta, Oklahoma, suggests a neat method of installing Gold'N Rod pushrods in the long thin fuselage of sailplanes which involves the exiting of the pushrod through the fuselage. The idea is to make a long smooth hole through the fuselage, the exact size of the pushrod and, in such a manner as to prevent the bending of the pushrod. Drill a hole large enough to accept a sandpaper covered dowel which is inserted in your electric drill, then insert the dowel (which should be about 14'' long) and gradually move the electric drill so the dowel moves in the direction the pushrod will be installed for a smooth exit. This results in a long perfectly shaped hole for the pushrod.

Due to constantly changing wind conditions, it is necessary to change the weight of the more highly developed gliders. The variable weight will enable the flier to obtain the maximum performance from his aircraft. The addition of weight to a location other than the C.G. will upset the trim of a finely tuned glider. As suggested by Lee M. Lippert of Apple Valley, Minnesota, an old style metal 35mm film can top is mounted in the aircraft with an access hatch positioned as per the design requirements for the aircraft. The base of the can may then be filled with lead shot. These pre-filled cans can be made up in graduated amounts up to a maximum of about 9 ounces each. For larger aircraft, provisions for two or more cans may be made. This method provides an accurate and sucure way of adding ballast. The sketch should be self-explanatory.

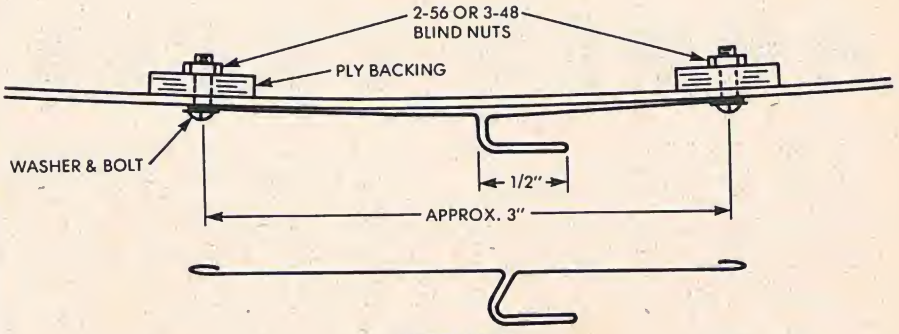
Lee also write that many kits show only one towhook position on the plans. While this may be a good average position, it would be nice to be able to adjust the hook depending on wind conditions at launch. An easy and very inexpensive way to make the hook adjustable is shown in sketch No. 2. Make several hooks from 1/16'' diameter music wire and vary the location of the hook from front to rear. You can even bend a new hook at the field if the ones you have don't suit the conditions.

NEW SOARING PRODUCTS

The Pokey 808, an East Coast Standard Class winner is now available from Dick Beltz Models, P.O. Box 169, R.D. #3, Lehighton, Pennsylvania 18235. The Pokey 808 has a wingspan of 99.8'', a wing area of 808 square inches, and an average flying weight of 35 ounces for a surface loading of 6 to 8 ounces per square foot. The kit features all basic hardware, full length fuselage sides, all parts machine cut,



SKETCH 1



SKETCH 2

plywood nose doubler, and a stable flat bottom airfoil. The Pokey 808 is rugged enough for a beginner and is very stable from launch to touchdown. It has a tight turning ability for small thermals and a wide speed range adding to its contest performance and durability. Price is $35.95 from Dick Beltz Models.

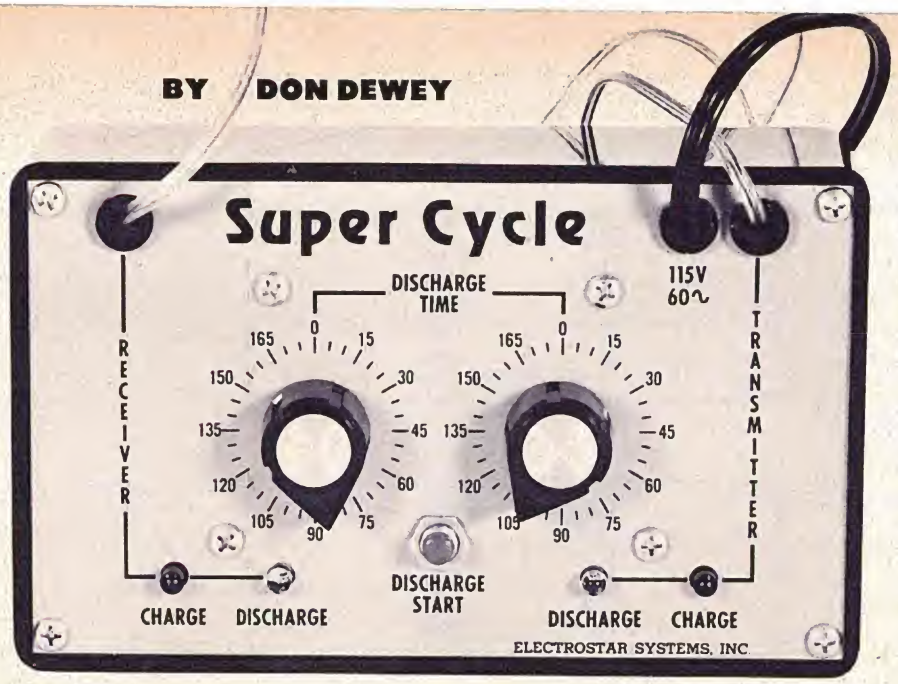
The Albatross, from Montrose Hobby, 2623 Honolulu Avenue, Montrose, California 91020, is the eleventh in a series of sailplanes designed over a period of three years. The primary goal was the design of a competitive high performance Standard Class sailplane. Each aircraft in this series was a test bed for various hardware, wing, stabilizer, and fuselage design. The tested parts were dependent not only on their own inherent shape and construction for performance, but also on their interrelationship with other parts and the total effect on the overall design.

The fuselage profile was designed for the lowest possible drag. The wing construction is of the D-spar type, using spruce spars with vertical grain shear webs and sheeted leading edge. The Albatross utilizes a 9% airfoil comprised of an Eppler 385 top section and an undercambered bottom section that starts at 24% of the chord. This airfoil, combined with the Albatross's wing loading, produces excellent penetration under windy conditions, as well as stable slow flight for light air conditions. The original design was designated the ML-11, by its designer Mark Levoe. The Albatross has a wing span of 99.75'' with a total wing area of 625 square inches for an aspect ratio of 15.7 to 1. The wing loading at its flying weight of 32 ounces is 7.4 oz. per square foot.

The Albatross fuselage is vacuum formed of ASA high impact plastic. This new material has an inherent toughness that virtually resists abrasion. The fuselage, being of pod and boom configuration, utilizes a fiberglass boom installed with a bulkhead inside the fuselage, again using off the shelf adhesives such as Ambroid or other common glues. The completed fuselage is then sanded and sprayed with a white epoxy primer. Almost any desired finish can be achieved by using Hobbypoxy, enamel, lacquer, etc.

The Albatross kit contains a complete hardware package; all balsa ribs have been machine cut and sanded from 1/16 material; the fin and rudder are machine cut from 1/4'' balsa with lightening holes optional. A blue tinted vacuum formed canopy complete with base is also furnished. The wing panels are of the plug-in type using a 3/16'' diameter hardened steel pin giving approximately 8 degrees of dihedral. The fuselage easily accommodates either a brick or individual servo type radio system. Retail price is $69.95 direct from Montrose Hobby. □

BY DON DEWEY



SUPER CYCLE

● During the past few months we have seen more commercially produced electronic gadgetry than we have seen in this hobby since the days of single channel and Gallopping Ghost. In those early days of R/C the gadgetry was primarily intended for one purpose — to coax, or otherwise intimidate, several functions from a single channel radio system. Today, with radio systems at a peak of sophistication and a reliability level higher than we ever imagined possible, we are faced with an array of electronic devices that will do everything from telling you how much fuel is left in your aircraft, to the amount of "juice" left in your airborne pack. Some of the items that have crossed our desks are so "far out" that they would even defy description much less any logical rationale for their existence. On the other hand, many of these devices have a very practical function and can add to your enjoyment of the hobby by providing you with information which you otherwise might not have had, or providing a "service" that might have taken longer or been more difficult to achieve without the device.

One of the most discussed areas of electronics today is that of the rechargeable nickel cadmium batteries used in our airborne and transmitter packs.

Most of these discussions center around the pros and cons of fast charging, slow charging, discharging, plotting discharge curves, and the like. If you have an understanding of electronics, then these discussions will be of value to you and you can accept or reject the theories and applications based on your own conclusions.

As for myself, I have virtually no understanding whatsoever of electronics — I simply like to build, and fly. When it comes to the radio system, all I really care about is that it **does** what it is supposed to do **when** it is supposed to do it. This will probably sound like heresay to the electronic types reading this article, but electronics just isn't my "thing." In fact, returning to the subject of nickel cadmiums, all I really know about them is that they have to be discharged, and, over the past couple of years, I have learned that they should be cycled through a charge discharge charge, in order to eliminate something called "memory." Beyond that point, why or how they work is of little interest to me, as long as they **keep on working!**

Several months ago, I wrote an article about Flite Life which would discharge your nickel cadmium cells and give you an indication on a clock of the discharge time. This cycling of the batteries would eliminate the problem of "memory," as well as spotting possible trouble in the battery pack itself. Now, another product has made its appearance on the market which has proved itself invaluable to me in that it is a completely automatic dual discharger timer charger. This item, called Super Cycle, tests and cycles the batteries every time you charge and does it completely automatically. In fact, it replaces your present charger and is just as easy to use.

Here's how it works. The Super Cycle was designed to minimize the possibility of flying with bad batteries by automatically testing the batteries before charging. This procedure is accomplished automatically so that it is no more difficult than using the charger that was provided with your radio system.

Here's how it works. The Super Cycle has a cord that plugs into the charging jack on your transmitter and another which plugs into the charging receptacle on your airborne pack. First, plug the Super Cycle electrical cord into an AC wall outlet. Next, plug the transmitter and receiver cables from the Super Cycle into the transmitter and airborne charging systems. Be sure the transmitter is in the off position, and that charging takes place through the receiver harness, and that the receiver switch is in the off position. Rotate the clock knobs on the Super Cycle to zero. Press the discharge start button and leave unattended for 12 to 16 hours, or longer. First, the batteries will discharge, which will take place in approximately 1½ to 2 hours. During that time the discharge lights for the transmitter and receiver on the face of the Super Cycle panel will indicate that your batteries are, in fact, being discharged. After the discharge is completed, the batteries will automatically go into charge at a safe 50 milliamp rate with the lamp indicating a charge current into each battery. In other words, the front panel lamps indicate when each channel is in a charge or discharge mode and the Super Cycle clocks will indicate the amount of discharge time on your batteries.

The Super Cycle draws an average current drain of 300ma from the batteries, the current being slightly higher at the beginning of discharge and slightly lower at cut-off. To determine the expected discharge time from fully charged good cells the following equation may be applied:

Current drain (ma) x (hours) = Milliampere hour (mah) rating of battery.

The mah rating is usually given for a particular current drain. At the 300ma drain of Super Cycle, standard batteries can be considered to be rated on an average of 15%. High rate cells are normally not derated.

In summary, when testing a standard 500mah cell with Super Cycle, deduct 15% of the mah rating or 15% of 500 (or 75mah) to give a corrected mah capability of 425mah. The expected discharge time of this battery, if it is operating according to its specifications, should be as follows:

$$\frac{425\text{mah}}{300\text{ma}^{*}} = 1.4 \text{ hrs. (approximately)}$$

* nominal Super Cycle current drain

Nickel cadmium batteries, if not properly used, will not operate at their full capabilities. The most common cause of short discharge time is when the batteries develop what is commonly known as memory. Typically, a memory is developed if the batteries are periodically charged and infrequently discharged to the knee of the discharge curve. Memory is also developed quite rapidly by overcharging. The effects of memory render a battery capable of yielding only a portion of its rated capability. Another effect of memory is the lowering of the individual cell voltages. To remove the memory from a battery, it should be cycled by a number of discharge and charge cycles until the discharge time is correct for its mah rating. In many cases,

short discharge times are due to weak cells which cannot be brought back by cycling. Frequently by replacing one weak cell in a pack, the entire pack will be brought back to its original specifications. A weak cell may be found by holding the discharge start button on Super Cycle down after it has automatically cut off and finding (with a voltmeter) the cell that goes down in voltage first. When a battery is not operating at its designed rating, it is more likely to completely fail than a battery which operates correctly. If discharge times are substantially below expected rating (allowing for some manufacturing differences between cells) be sure to replace the weak cell in the battery pack.

Super Cycle has been designed to incorporate sliding cutoff voltages in both the transmitter and receiver sections. The cutoff voltages start higher at the beginning of the discharge cycle when individual cells may have a higher cell voltage after charging. This feature precludes the possibility of cell reversal. As the batteries start to discharge, the cutoff voltages of Super Cycle are automatically lowered slightly to assure reaching the knee of the discharge curve, preventing inaccurately short discharge times and properly cycling weak cells. In all cases, however, cutoff will occur before 1.05 volts per cell (in matched cell packs). In cases where one cell is weaker than others in a pack, the weak cell will go lower in voltage; however, discharge will cut off before cell reversal.

In summary, Super Cycle will give the maximum discharge times that the batteries are capable of, always reaching the knee of the discharge curve without ever damaging a cell.

CHARGING

As soon as either battery reaches the end of its discharge period, it will independently and automatically switch to charge as indicated by the front panel lamps. The charge rate is fixed at 50ma. This charge rate is a safe continuous charge for most R/C batteries. It is known as the C/10 rate for a 500mah battery, which constitutes the most commonly used type in R/C. The battery may vary slightly from 475 to 550, etc., still remaining in the safe 50ma charge rating. The length of time required to charge a battery will depend slightly on the exact rating. To determine the time required to fully charge, go through charge and discharge cycles increasing the charging time from 10 to 16 hours until you have found the length of charging time required.

In summary, charge for 10 hours, note discharge time. Charge for 12 hours and note discharge time. Charge for as long as required to reach full or near full capability. On the average, 10 to 12 hours charge time will bring most batteries up to 90%-95% of their capability. Some high rate cells require initial charging at high current rates when new. We suggest you use the charger that came with your system for the first few charges. After this, the Super Cycle charger will bring them to full charge.

The Super Cycle is easily installed if the following basic objective is understood. The cables of Super Cycle should be electrically connected **directly** to the transmitter and receiver batteries. Observe polarity — the gold wire of the Super Cycle cables is positive and the silver wire negative. If you have previously installed another discharger, such as Flite Life, the Super Cycle cables can go directly into the Flite Life installation. For original installations, proceed as follows.

A. **Separate Charger Systems:** Remove the charging plugs from your present charger and install these plugs on the Super Cycle cables. Since Super Cycle replaces your charger, these plugs may be permanently connected to the Super Cycle cables. Again, be sure to observe polarity.

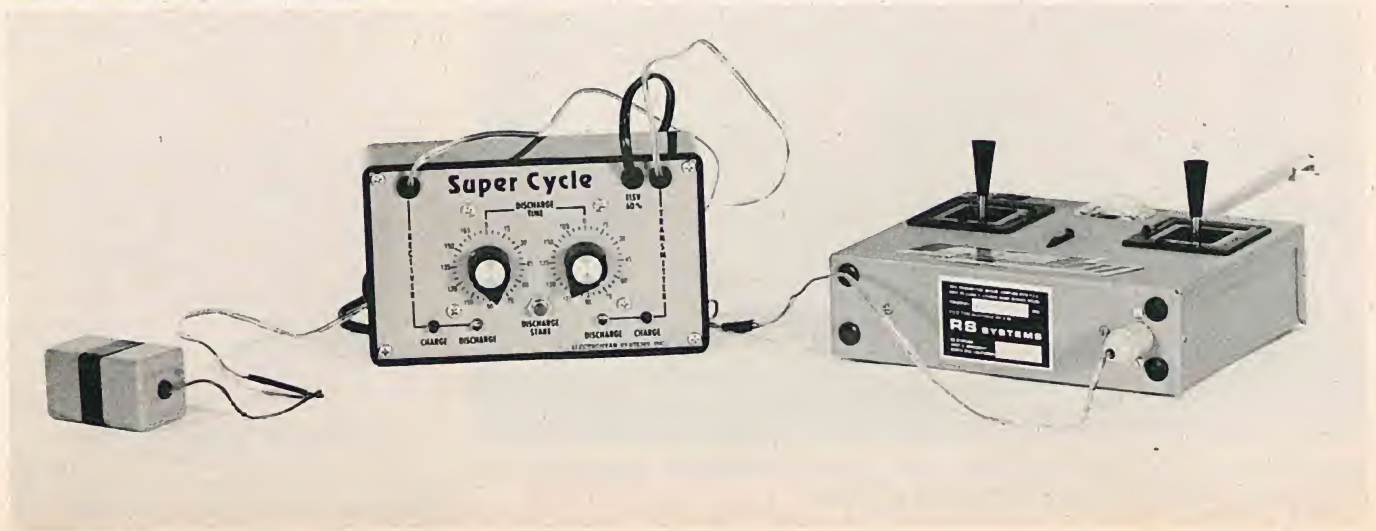
The instructions accompanying Super Cycle indicate how to use this device with systems that have an internal charger in the transmitter and for radio systems using a radically different charging set-up. However, if you do modify your transmitter to use Super Cycle, you may void the radio manufacturers warranty by this modification.

The specifications for the Super Cycle consist of an average discharge current of 300ma nominal. The cut off voltages are 9.2 volts on the transmitter, and 4.4 volts on the receiver decreasing slightly as discharge progresses. The transmitter voltage 9.6 volts (8 cells), receiver voltage 4.8 volts (4 cells). Six or twelve volt transmitter voltages are available on special order only. AC is 115 volts, 60 cycles which is required for the clock operation and charging cycle.

For those of you, like myself, who are not electronically oriented, this fully automatic dual discharger / time / charger provides completely unattended operation for discharging and charging both your transmitter and receiver battery packs independently and simultaneously. The procedure that I use is to simply plug the system into my transmitter and airborne packs sometime late in the afternoon, push the discharge start button and forget about it until the next morning. At that time both my battery packs will be fully charged and I can read the discharge times from the clock knobs on the front of the Super Cycle unit. After a few such cycles, you are aware of what to expect from a given battery pack, and any major deviation from the normal discharge time will be immediately noted and serve as a warning that there is a possible problem in that battery pack.

Manufactured by Electrostar Systems, Inc., 116 Toledo Street, Farmingdale, New York 11735, the price of the Super Cycle is $49.95 plus $1.50 postage and handling, and comes with a 90 day product warranty. Quite frankly, having used this system for the past two months, I wouldn't be without it. For a guy like me who doesn't know the difference between an integrated circuit and a segregated one, Super Cycle tells me all I want to know about batteries and all I have to do is push a button. For the electronics technician and engineer it may not be the infinite cure-all for whatever problems may occur with nickel cadmium batteries, but if it didn't work for me, I wouldn't be telling you about it. □

One of RCM's radio systems plugged into the Electrostar Super Cycle. Note discharge times.



Schluter Gazelle by Walter Knaus. Photos taken at First Canadian R/C Helicopter Contest.

Frank Machon's beautiful Kavan Jet Ranger.

Don Chapman, Bill Curtis, Dave Keats, Terry Nelson, Rudi Mayer. STANDING, L TO R: The Hon. Charles Turner, MP, and Walter Knaus.

NRCHA

BY DON DEWEY (N1A)

● This month we'd like to start off by congratulating Dr. D. Theodore Opperman of Pen Argyl, Pennsylvania, who was the one thousandth member of the National Radio Control Helicopter Association. This will give you an indication of how fast the interest in helicopters is growing, and if you haven't yet joined the NRCHA, all of us will welcome you as a member and look forward to receiving your Grade Level achievement as you progress through the Proficiency Program. Congratulations Dr. Opperman.

★ ★

The first Canadian Radio Controlled Helicopter contest was held in London, Ontario, Saturday and Sunday the 5th and 6th of October 1974. 11 registrations were received but only 7 pilots competed in the flying events.

It was a typical Canadian Fall weekend, beautiful clear sunny days with the temperature in the low 60's, the trees looking lovely in all their autumn shades. There was only one adverse weather condition and that was the wind which blew between 20 and 25 mph with gusts between 30 and 35 mph.

In spite of the wind a tremendous effort was made by all the participating pilots, who came from as far away as British Columbia, Pennsylvania, and Ohio, as well as closer to London, to fly all the maneuvers. Only one maneuver had to be cancelled for safety reasons. Great skill was shown and the wind certainly separated the men from the boys when it came to flying under the wind conditions experienced.

Exceptional skill was shown by the three pilots from the United States: Dave Keats, Bill Curtis, and Don Chapman, and they all did very well in the Expert maneuvers.

Dave Keats flying his Polecat was quite at home in the strong winds and he put on a perfect flying demonstration which was enjoyed by the several hundred spectators who turned up for the event.

In the Novice class all the pilots did exceptionally well and Don Dow of Ottawa, who is one of the most proficient Canadian pilots, gave a very good flying demonstration for the benefit of the spectators.

On Sunday afternoon at the end of the meet, the Hon. Charles Turner, MP, presented the trophies and prizes to the winners of both the Expert and Novice events, and said a few words of welcome which were exceedingly appropriate and well received by everyone there.

★ ★

Helicopter Hints And Kinks

Have you ever tried to fit 2½° of coning angle in a rotor made with a dime store protractor? It isn't easy, is it? Nor, is it

accurate. And, according to Roy Foote (N9D), writing in the RAMS Horn newsletter of Radio Aeromodelers of Seattle, there is a better way.

A little basic trigonometry will help us a lot. You don't have to be a trig genius to use this method, you need only know how to measure and multiply. For example, let us assume that you are going to put 2½° in your Polecat rotor blades. Step 1 is to measure the length of the blade, which is 18''. Step 2 is to multiply 18'' x sine 2½° (.0436) which equals .785''. Step 3 is to add the thickness of the rotor head which is 3/8'' (up to the leading edge of the rotor blade at the hub end). Step 4 is the total height of the leading edge of the blade tip installed on the rotor hub, which is 1.160''.

The following are some other angles that you may find closer to what you want:

Sine 1° .0175
Sine 1½° .0262
Sine 2° .0349
Sine 3° .0523

The sketch accompanying this article should help remove any remaining mystery from Roy's calculations.

★ ★

If you're having difficulty getting the O & R 1.34 engine in your Du-Bro Shark or Hughes 300 working properly, here are a few items that may help you out and eliminate having to send it to the factory for repairs.

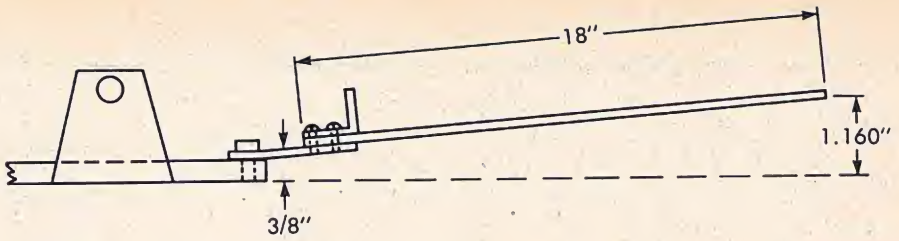
First of all, watch the nitro content of your fuel. In no case use a fuel with higher than 15% nitro. Actually, these engines are happier on a 10% to 12% nitro content fuel.

Secondly, do not use any form of fuel filter in the fuel line from the tank to the engine. There is none made large enough to prevent an unrestricted flow of fuel to the O & R engine. In addition, do not use a filter type clunk in your fuel tank. We recommend using a 16 ounce Sullivan SST tank with the clunk provided in the Sullivan kit.

Next, make sure that your needle valve is set at a proper setting. Each of these engines varies, and our Shark is properly set at 13½ turns open. These are rich running engines, and they should spit fuel all over the place when they are adjusted to the proper setting.

Another cause of problems with the O & R engine is leakage around the brass glow-plug insert. If you detect any sign of leakage, remove the brass insert and coat the threads with Permatex No. 2 gasket material and then thread back in place. By the way, the Volkswagen spark plug washer can replace the gasket on the brass insert if you need a new one.

Also, run a thin wire gently into the carburetor holes and make sure that they are clean at all times, in order to assure proper operation. This should be done periodically as a part of your normal maintenance of your O & R engine. Also, you may have to go through several different glow plugs to find one that works well with your particular engine. We use Fox long reach 1½ volt idle bar plugs, but often have to try 4 or 5 to find one that works best with with our particular

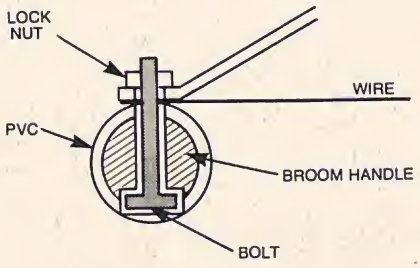


engine.

★ ★

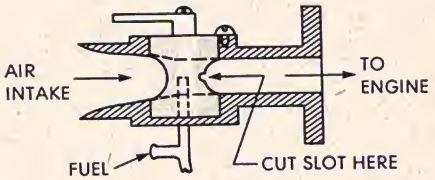
James A. Gasowski (N243F), serving aboard the USS Saratoga, writes that, during the construction of his Du-Bro Shark, he had a problem keeping the plastic fuselage sides bonded together. Jim solved his problem by first sanding the inside of each fuselage side near the seam to give the glue something to hold to. He then placed a 2'' piece of fiberglass tape across the seam, held in place with Formula I Hobbypoxy glue. By using this adhesive and the fiberglass tape, you get an extremely strong and flexible joint. You can then cut and sand off the outside seam even with the fuselage, removing the unsightly ''hump'' from the outside of the fuselage.

★ ★



Michael J. Padrezas of Corpus Christi, Texas, has been using his own design training gear on his Du-Bro Shark and has passed on the construction of this gear in case someone else would care to try it. Mike purchased one 10' piece of 3/4'' diameter PVC pipe at the local hardware store and then bent some new supports and, with a little wire, made up the training gear shown in the sketch. You'll find that PVC pipe slides very easily over an asphalt or dirt surface and takes abrasion far better than do the aluminum skids used on most helicopters.

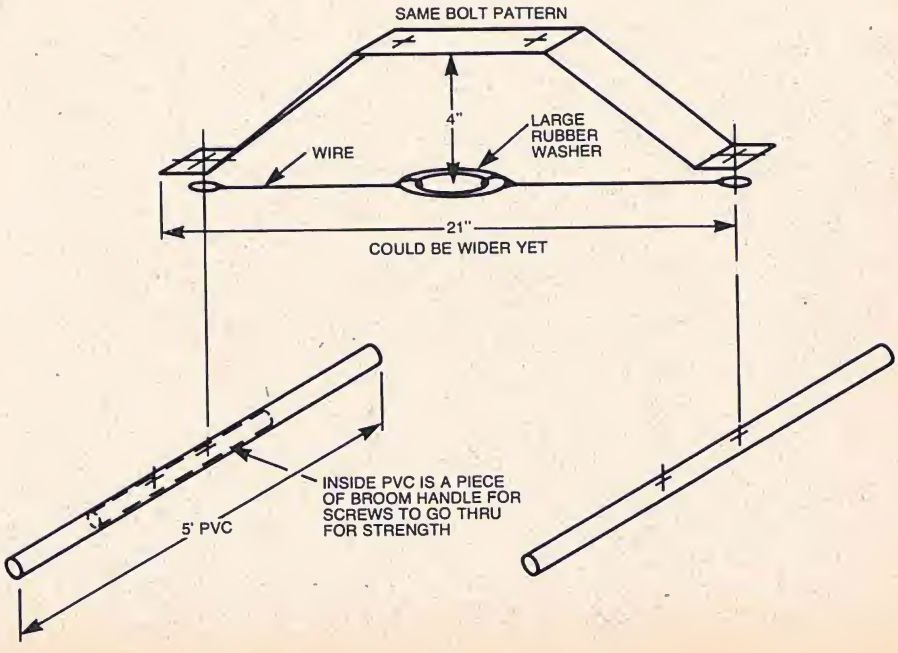
★ ★



Alonzo Richardson of Burlingame, California, passes on the following carburetor modification that has worked well on the O & R engine on his Hughes 300:

According to Alonzo, if the engine can be made to stop with full low throttle and full low throttle trim, the damage to the rotor blades can be reduced when a tip-over takes place. There are many times when you want to kill the engine quickly for other reasons.

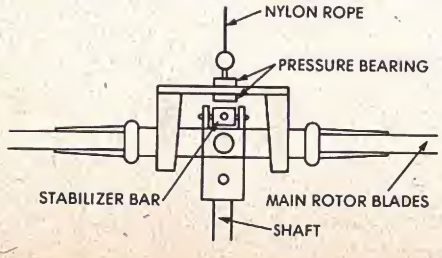
The O & R engine often leans out at low throttle and speeds up before stopping. This is due to the fact that the air passage through the carburetor barrel is smaller on the backside than on the front and, therefore, closes first. This reduces the vacuum at the needle valve, leans out the mixture, and speeds up the engine. The old trick of slotting the rear edge of the barrel provides an air passage to maintain the vacuum at the



needle valve until the front air passage closes, cutting off the air in a rich mixture condition, and stopping the engine with no last minute speed-up. The speed can be reduced until the rotor blades will stop but the engine will continue to run. It takes only a small slot about 1/16'' square to do the job, so go easy on the cutting, and try the results on the engine before going too far. The sketch sent in by Alonzo is self-explanatory.

Dr. Thomas Loebenstein of Vienna, Austria, participated in a very interesting program for a television commercial in Vienna which utilized a Kavan Jet Ranger. This commercial concerned a very exclusive brand of kitchen furniture with a similar television spot having been made before, showing a big truck carrying a huge container to an ancient castle. This time, a helicopter was to lift the container to the top of a penthouse on a high building. According to Dr. Loebenstein, they first tried this with a full-size Bell Twin Jet but, after several takes, discarded the idea in favor of a model helicopter.

The Austrian importers of Kavan Products were asked for help. However, the first try with an electric driven mock-up Jet Ranger, lifted up by a crane using an invisible nylon rope, failed. In fact, the engine and the transmission in the Jet Ranger broke. So Dr. Loebenstein was asked to try it with his HP .61 driven Jet Ranger as it was one of the very few flying in Vienna. Nobody wanted to risk another failure, so Dr. Loebenstein's Jet Ranger was also equipped with a hook and a kind of pressure bearing on top of the rotor head as shown in the sketch. The procedure worked



The unique model of the giant cargo-carry Aerocrane is actually a 'helicopter'.

fine and the rotor could turn free at high speed so that the whole thing looked very realistic as you can see from the photographs. But Dr. Loebenstein wanted to try to see whether it was possible to lift the container without ''cheating.'' The weight of the container was approximately 4.5 pounds.

First, the training gear on the Jet Ranger was set at a much wider stance than the container and the engine was started with the chopper standing on two high boxes and the container hanging under it. With the pitch in normal lift-off position, nothing happened but, nearly at the end of the servo travel, the Jet Ranger started rising. It was found to be extremely unstable insofar as the tail rotor was concerned and Dr. Loebenstein had to settle it down after a few seconds. Tail rotor adjustments were made and he tried again. The same thing happened, but this time it worked a bit better. He made several other attempts but it never really worked to perfection. Dr. Loebenstein points out that the problem is in having too much pitch so that the torque becomes too high. Perhaps that 6' container produces a very special kind of ground effect adding additional instability. Another problem was that the oil from the exhaust was sprayed right over the container and deflected back up. It, in turn, was sucked back into the chopper and Dr. Loebenstein had to clean the Jet Ranger, even in the radio compartment!

At the end of his letter, Dr. Loebenstein pointed out that it **is** possible to lift loads with a model helicopter but it seems to be quite difficult to find the right adjustments for the pitch and the tail rotor. However, there were no problems at all with the HP .61 although there was an extreme load on it.

★ ★

And, if you think that was an unusual use for a radio controlled helicopter, take a look at the picture of the model of the Aerocrane to be manufactured by All American Engineering Company of Wilmington, Delaware. Mr. Arthur G. Crimmins, Manager of Aerocrane programs at the Delaware company has revealed that his company has developed a unique machine which combines the lifting forces of a helium filled balloon with a rotating helicopter blade. To demonstrate this new concept to Navy officials, the company built a 1/10th size scale model of the 330' rotor diameter, 50 ton machine. This 33 foot rotor diameter model was powerd by four Astro Flight electric motors.

The model shown in the photograph, carries a 25 pound payload in a box suspended on cables. The red and white Mylar helium filled balloon is 15' in diameter and provides about 10 pounds of lifting force. Four balsa sheeted foam blades, each 9' long by 18'' wide, provide 15 pounds of lifting forces at 10 rpm! Each blade is powered by a standard Astro 25 motor run at half voltage and turning a 12/4 Top Flite prop at 6000 rpm. Full cyclic and collective pitch control is provided and the motors are run at constant speed. In contrast to most helicopters, this machine, due to the very low rotational speed, makes almost no sound. From a short distance, only the noise of the 12/4 props can be heard.

The gondola, cyclic pitch mechanism, and payload carrying structure is stabilized from rotation by a small De Servo motor

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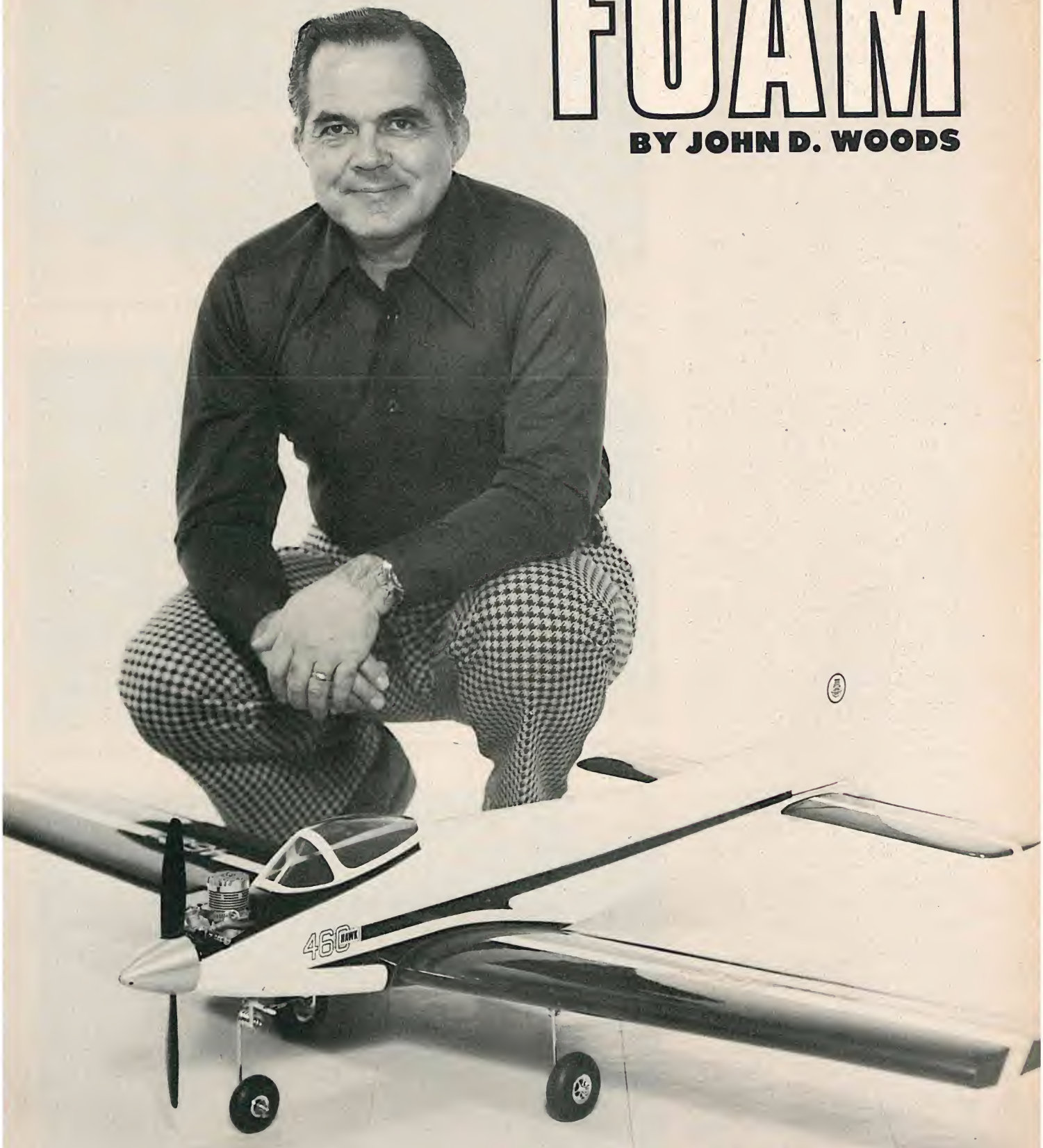
FOAM

BY JOHN D. WOODS



TODAY'S BEST WAY TO BUILD A MODEL AIRCRAFT

PART III

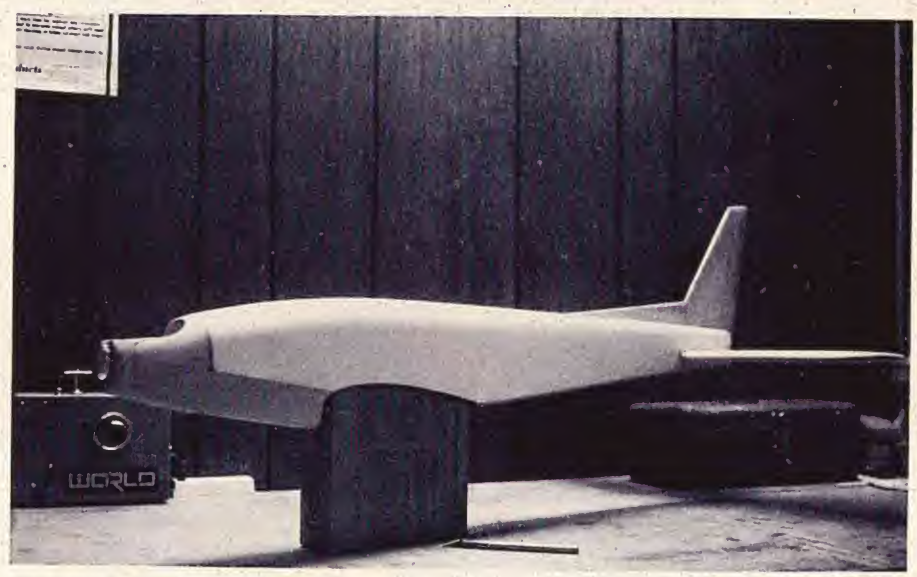
This article is the third and final one of this series and will deal with a step-by-step method for covering and finishing a foam fuselage. This method is equally adaptable to both scratch-built foam fuselages (if you are so inclined), or finishing the World Engines Hawk 460. This method, **if followed religiously,** will produce a fuselage of unsurpassed beauty and durability. The reason I emphasized "if followed religiously" is that if you want to ad lib, I will not take any responsibility for your results. I have spent 8 years slowly developing the best way to do this process correctly and, believe me, I have made all of the mistakes that you will encounter if you decide to significantly deviate from these simple steps. "Simple" is also another significant term in this dissertation because simplicity was one of the primary goals during the development of this process.

The reason the Hawk 460 was selected for the subject of this article is that the foam casting, as John Maloney likes to call it, is probably the best foam fuselage on the market today. It is reasonably light and the density of the foam (bead size) makes a very smooth and stable surface upon which to apply the finish. Each significant stage in this procedure will be illustrated with at least one picture to further clarify the step and pictorially let you know how your fuselage should look at each point.

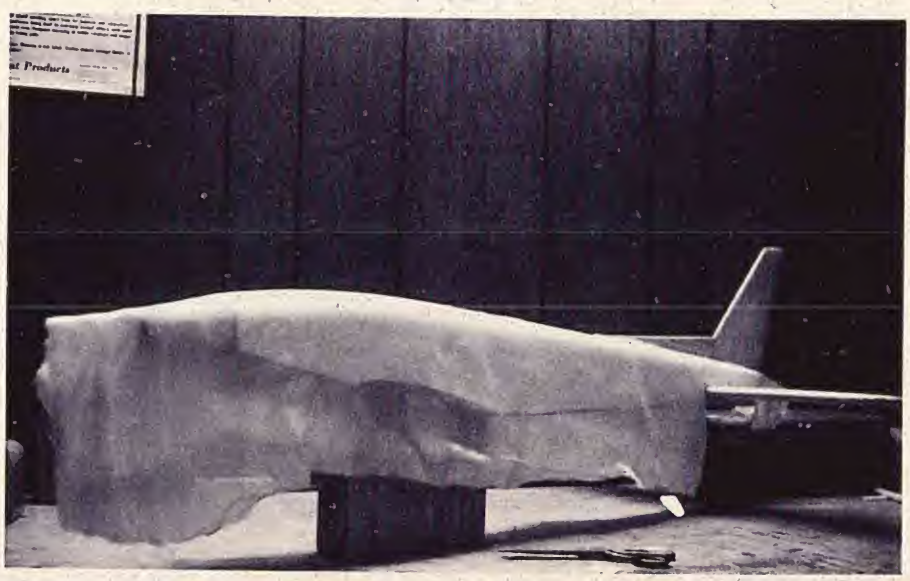
Oh, one thing I forgot to mention is strength. This method, in addition to producing a model that looks like it is covered in glossy plastic is also strong enough that you can squeeze the fuselage at any point and not compress or deform it. Try that with your balsa, fiberglass or plastic fuselages if you dare. It is so strong when finished that it could almost literally be used as a baseball bat although I would not think that even the most adventuresome souls would try it. One additonal advantage to this is that this construction step also doubles as a finishing step, thereby saving more time. How can you go wrong? Here is a construction / finishing method that results in a stronger, cheaper, and prettier model than you could achieve with most of the other materials used to construct model aircraft fuselages — **and** do it with one heck of a lot less elbow grease. Are you convinced? If so, let's get into the meat of it.

First of all, when you remove the foam fuselage from the box, notice that there is a piece of tape down the spine. Pull this off and discard it. Notice also that the whole thing is covered with tiny warts. These warts or points occur when the foam heads are expanded in the mold by steam. The steam escapes through tiny holes in the mold and as the beads expand, they pass out into these holes. Also, there is a mold join line down through both sides of the casting caused by the foam expanding out along the seam line between the two halves of the mold. In order to get a smooth surface on which to apply the desired finish you must sand these irregularities off. The proper and

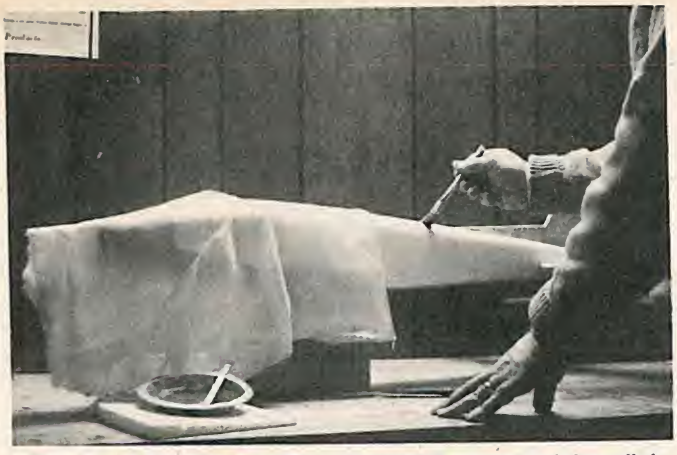
Unsanded foam casting of the Hawk 460 shows the mold line that requires sanding smooth.



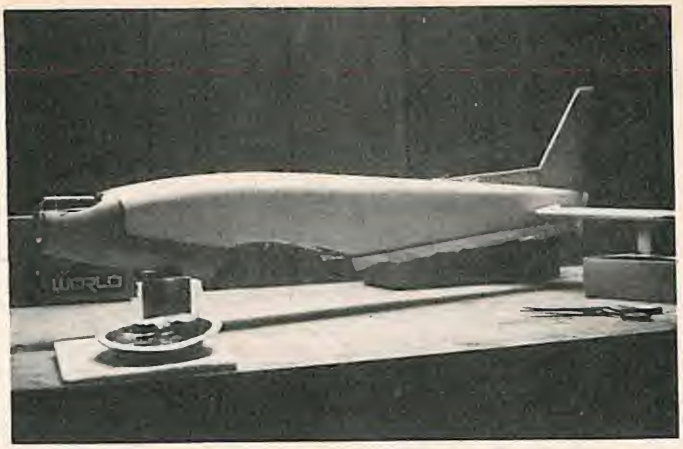
Fuselage sanded smooth with empennage and wood front end finished ready for fiberglassing.



Fiberglass cloth cut oversize and fitted over fuselage.



Glass and Hobbypoxy glue is applied – note mixing dish for glue from pot pie tin.



Shows glass cloth completely adhered to fuselage and trimmed. Notice the fuselage is supported on "dry" parts to prevent gluing it to the box.

easiest way to do this is to use a sanding block and 80 grit garnet paper and have at it. Sand in one direction only since rubbing back and forth with relatively rough sandpaper can sometimes pull the beads out of their little cubby hole and leave a depression that must be filled. The 80 grit garnet paper is a must. Ordinary sandpaper does not cut as cleanly as garnet and does not produce as good a result. This whole operation should take about 10-15 minutes. Your fuselage should then look smooth and will feel a little like fine velvet. The next construction steps are covered throughly in the Hawk 460 instructions so I will not go into them here except to say to sand everything smooth in preparation for the application of the Hobbypoxy II glue and the fiberglass. This applies especially to the foam/balsa and the foam/ply join points. Your fuselage is now ready for glassing and should look like Picture No. 2. By the way, do not let the unfamiliarity with fiberglass scare you off here because this method is considerably easier than silk and dope or polymer films in its ease of application.

Set-up the fuselage on a suitable sized box that will fit into the equipment cavity similar to the one shown in Picture No. 2. This will allow you to easily work around the fuselage. Cut a piece of fiberglass cloth large enough to extend approximately 2'' beyond both ends of the fuselage and 2'' bigger than necessary at the bottom edges. The fiberglass cloth should be lightweight and close weave to produce the best results. The lightweight or medium weight cloth stocked by Sig works very well. You can cut a roughly rectangular shape because the fit on the fuselage is not critical. Now, cut a slit in the middle of the rear of the rectangle to allow the cloth to lay flat on either side of the verticle fin. Now, lay the cloth on the fuselage and partially smooth it over the entire shape but allow it to hang straight down from the bottom edge of the fuselage.

The horizontal stab is in the way now, isn't it? To take care of this problem simply cut straight in along the leading and trailing edges to the fuselage then cut the rectangle away along the upper stab/fuselage join line. This cut should allow the cloth to cover all of the foam surface and hang straight down from the lower edges of the elevated fuselage. Cut 2 small pieces of fiberglass cloth to cover the exposed foam below the stab and lay them to one side. Your fuselage should now look like Picture No. 3. Pick up the aft half of the cloth and lay it back over the front half. Picture No. 4 clearly illustrates this step.

Mix an appropriate amount of Hobbypoxy II glue and brush it on the rear half of the fuselage with a metal handle stiff bristle flux brush **directly on the foam.** Lay the cloth back over the glued surface and gently smooth out any wrinkles or bulges in the cloth. **Do not brush glue through the cloth.** Pick up the front half of the cloth and lay it back across the fuselage half just completed. Mix another batch of Hobbypoxy II and apply it directly to the foam in exactly the same way as you did the other half of the fuselage. Brush the glue over the balsa parts even though you will not put fiberglass cloth over these areas. Lay the cloth back over the front half and gently pull out and smooth out the wrinkles in the cloth. Patting the wrinkles, particularly after the glue gets just a bit tacky, will cause them to better adhere to the foam. If you develop a big one or two that will not press down simply cut straight up the wrinkle with your scissors and make a lap joint at that point. I have found that if you work or slide the wrinkles from top to bottom and rear to front, working them off the front or bottom of the fuselage with one or two fingers you can eliminate most of them.

Now, do a little rough trimming of the excess cloth along the bottom edge of the fuselage and around the balsa/foam joints at

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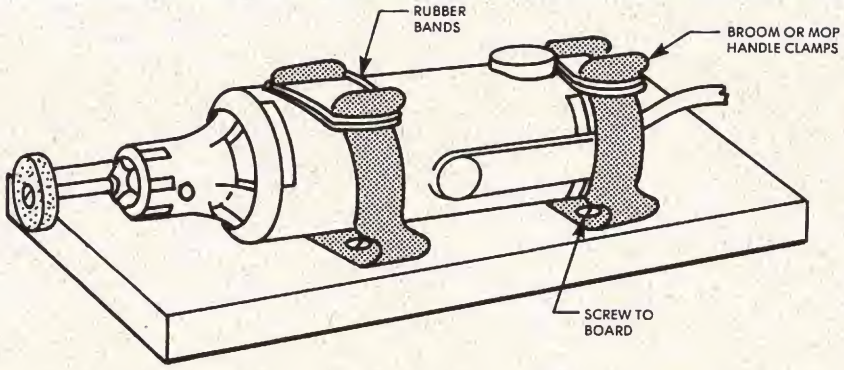
Glass cloth shown trimmed from lower edges of fuselage, roughness sanded off and a second coat of glue applied. Note plastic wrap over box.

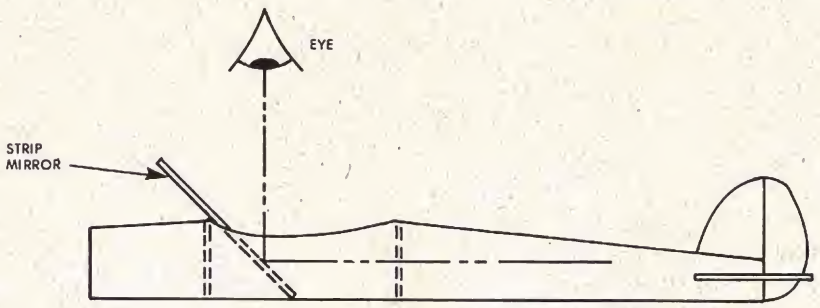
Canopy is glued to fuselage after washing and finishing under canopy area and the last coat of glue is brushed on.

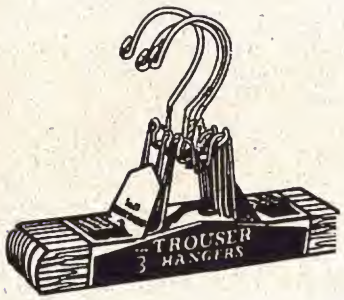
FOR WHAT IT'S WORTH

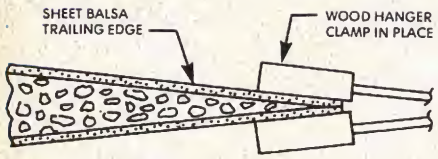
If you are looking for a way to mount your Dremel Moto-Tool, or other hand power grinder to a board for use as a grinding tool, try an inexpensive broom handle holder available at your local hardware store. As shown in the sketch from Frank Parykaza of Willingboro, New Jersey, this is an extremely simple method of semi-permanently mounting your Dremel Moto-Tool. Note the rubber bands on top of the clamp.



W. Schubach of Victoria, Australia, writes that when he drops a servo arm screw into the fuselage and it disappears under the servo tray or, he cannot get the pushrods through the guides, he automatically reaches for one of his mirror strips. With a mirror strip, you can look into the inaccessible spaces and see what is going on. The strips of mirror are about 6'' long and range from 1/2'' to 3'' wide. W. Schubach obtained the mirror strips from the local glass merchant who gave them to him at no charge from his scrap box.

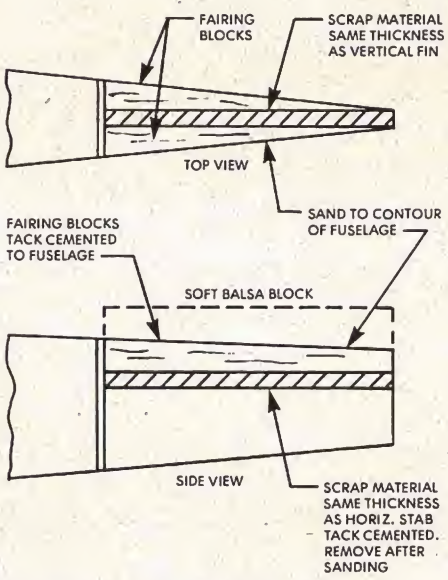




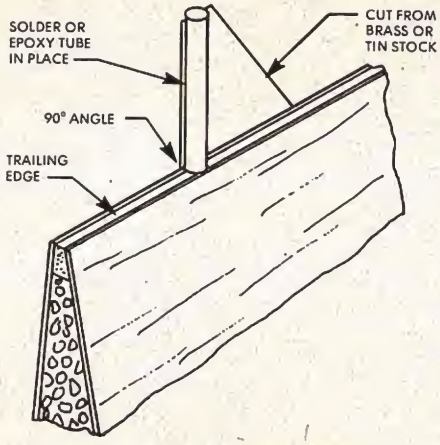


If you want a set of ''can't-be-beat clamps'' for large areas of sheet balsa, try using wooden pant hangers. These are especially good for sheet trailing edges on foam wing cores. With the hooks left on they also make excellent hangers for grabbing something you want to paint then hang in a dust-free closet to dry. It can also be rotated 360° during spraying. R.O. Petro of Athol, Idaho, lines the inside jaws of the wooden pant hangers with thin felt applied with white glue so they won't marr whatever is being clamped. The more you model, the more you will find uses for this item.

Bill Charbonneau of Columbia, Maryland, submitted the following suggestion for an easy method of shaping stabilizer fairing blocks. In place of the vertical fin and horizontal stabilizer, scrap material of the same thickness is tack cemented to the fuselage along with the fairing block material. Then sand the structure to the contour of the fuselage, remove the scrap material, and you have perfect fairings.



If you want to transfer a pattern to either wood or cloth, first copy the design on tracing paper. Next, place a plain white sheet behind the tracing and make a Xerox copy. Now place the Xerox copy face down on the wood or cloth material. Rub the back of the Xerox copy with a cloth dampened with lacquer thinner. Remove the Xerox copy and you will find that the pattern lines will have transferred on the material as a reverse image. This idea was submitted by Byron E. Blakeslee of Littleton, Colorado.



For installing Robart Hinge Points at a 90° angle to the trailing edge of your wing, build this simple jig suggested by Mike Knouse of Midwest City, Oklahoma. Fabricated from a piece of tin and 5/32'' brass tubing, just set the jig on the trailing edge and run your 1/8'' drill bit through the tubing and into the trailing edge. You will find that you have a perfect hole for your Robart Hinge every time.

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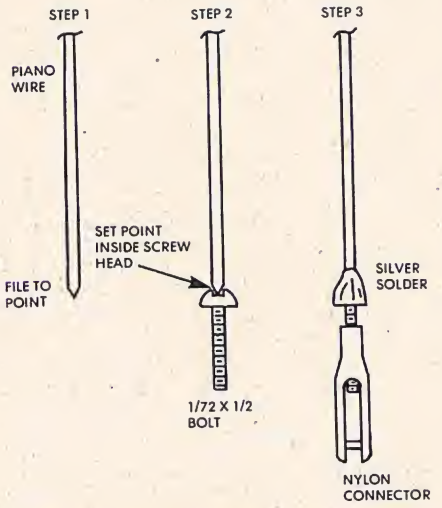
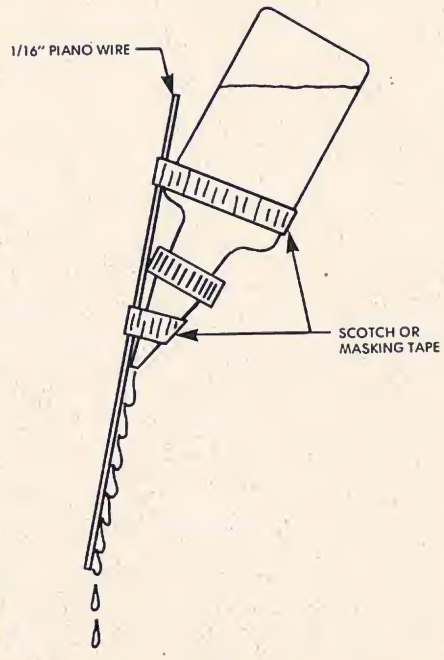
FOR WHAT IT'S WORTH

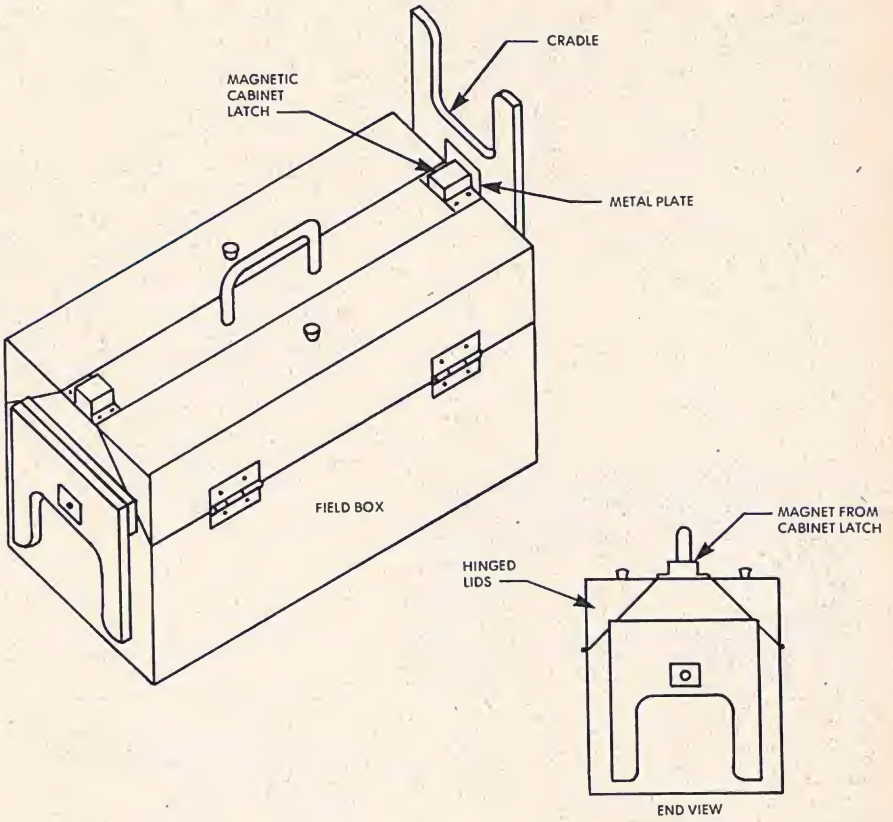
The following sketch from Miles Jackson of Indianapolis, Indiana, shows how to install a simple collapsible cradle for your field box. You will find that the magnet holds the cradle in an upright position for field use while still collapsing for storage. While in the up position the box sides can be folded down without taking the plane off of the cradle.

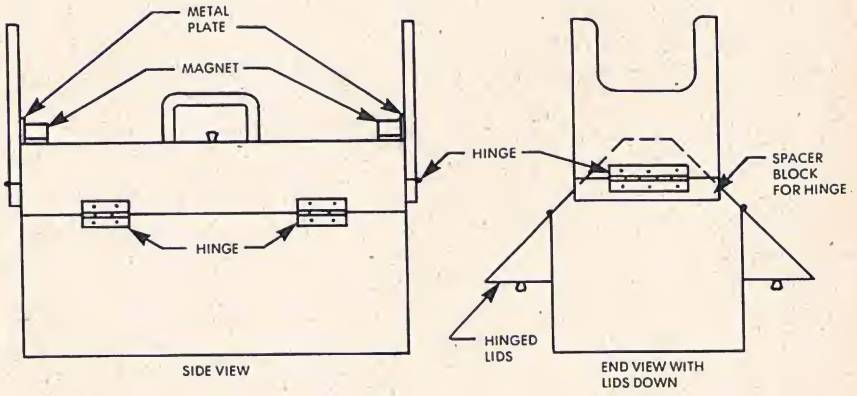


A home-made pushrod connector can be made for custom jobs, as suggested in the following sketch by Bryce Peterson of So. Charleston, West Virginia. First, file a point on your piano wire and place in the screwdriver slot of a 1/72'' x 1/2'' bolt or its equivalent. Apply flux and silver solder the bolt to the wire. Finally, add the nylon connector and your pushrod is completed.



Fran Olix of University Park, Pennsylvania, writes that most builders use a white glue such as Elmers, Sig, or Titebond, either part or most of the time. The problem which he ran into was how to get glue into hard to reach spots such as inside a fuselage, without dropping it all over while trying to make it fall onto the proper spot. To overcome this problem, Fran rigged up a very simple but effective addition to a small bottle which he uses only for ''hard-to-get-at'' spots. As you can see from the sketch, this is, essentially, a home-made glue gun without having to worry about the thing clogging up. Simply tape a 5'' piece of 1/16'' piano wire to the glue bottle so that the wire passes as close to the opening in the end of the plastic bottle as possible. Now the glue will be able to run down the wire and be directed and flowed into, or on to, exactly where you want it while the glue bottle can be kept outside of the fuselage or whatever part you are working on. It really does work well for those tight spots. Simply wipe off the excess with a paper towel and it will keep the wire clean and ready to go for the next time.





According to Daniel Rossman of Havertown, Pennsylvania, it's hard to avoid breaking triangular stock after you slit it for use in curved applications such as wing fillets. You can avoid that breakage by putting a piece of masking tape on the ''bottom'' of the stock. Then slit it as far as needed and bend as necessary. After the stock is glued in place, strip the tape off and fill the slits if required. □

HOVER

from page 66/64

drive. "Forward" direction is indicated by the red arrow on the "tail boom." The ease of handling of this large model is demonstrated by the fact that Mr. Crimmins, who has had no previous R/C helicopter training, successfully piloted his machine on his very first flight.

Eventually the full-size 50 ton slingload Aerocrane will have four 112' long by 18' wide wings, each having a turboprop powerplant mounted on the 150' diameter spheroid. The Aerostatic portion of the full-size Aerocrane is sized to achieve sufficient buoyancy to lift the total vehicle weight, including fuel, plus up to 50% of the sling load — in this case 50,000 pounds. The Aerocrane will add a totally new dimension to the performance of air vehicles with respect to payload capability, vehicle cost per pound of payload, and operating cost. Thus, the revolutionary Aerocrane — a whole new concept in cargo transporting — is being developed with the use of a most unusual radio controlled helicopter.

★

Lloyd Carter of Dover, Delaware uses an airborne glow plug supply in his Du-Bro Shark but does not use the extra servo as illustrated in the previous Hover column. Since Lloyd did not quite leave room enough for a fifth large Heathkit servo, he figured a micro switch ought to do the trick. Since he couldn't immediately find one that was small enough to fit in the upper area between the servos, he installed two 5/16" standoffs on the front bottom edge of the wood servo rails in a position to have the trigger arm controlled by a linear output of the throttle servo while the cross arm of the servo takes care of the throttle. The glow plug battery is set up to cut in and out at about 1/3 throttle in Lloyd's installaion, although this could be set up to cut in and out at any position an individual desired. This is easily adjustable by a slight bending of the micro switch trigger arm or by the mounting of the switch itself. The micro switch Lloyd used came from the mechanism of a Clark Electric refrigerated warehouse door. Any electrical parts shop such as Radio Shack stores carry micro switches in all sizes and ranges and the individual modeler can set one up to suit his own installation.

★

Finally here are a few hints and kinks on the Du-Bro Shark submitted by Bob Jones of Mentor, Ohio:

Much has been written on this fine machine, and I agree fully with the high praise which has been accorded as a result of Dave Gray's engineering talent. The following suggestions are minor but important improvements which may be made to your Du-Bro Shark.

First of all, with regards to the body, do not cut out the side windows in the body sides. Instead, paint the window area with Hobbypoxy in the color of your choice. The reason for this is that you add considerable strength to the plastic body itself. When you have passed the training gear stage, the windows can then be cut out and the transparent butyrate windows installed. Secondly, double all seams in the body as well as high stress areas with scrap ABS Plastic left over from the Shark body assembly. Use mass amounts on the sides where the four screws hold the body and the aluminum front plate to avoid tearing the holes from shock and vibration. Also, do not cut off the "rib" on the top of the windshield. It greatly increases the stiffness of the finished structure and is hidden inside the top of the body where it cannot be seen.

The next item is with regard to the tail skid on the Shark. I made a new one and have watched it save my "tail" numerous times. Start with a new length of 1/8" music wire cut to a length of 22". Put a 3" diameter, 180° bend right in the middle of the 22" length. Cut a piece of 1/8" I.D. brass tubing 1½" long. Flatten about 1/2" of one end and drill a 7/64" hole in the center of the flat. Sweat solder the brass tube on one end of the music wire, forming a spade. To install, insert and set screw the end of the skid in the Du-Bro tail skid mount and bolt the brass tube "spade end" to the rear boom strap with the same 4-40 bolt which holds the boom braces. Be sure to adjust the bend of the skids so no strain is imposed on the tail skid mount. The new tail skid won't bend away exposing the tail rotor to damage or sink into soft ground as easily. □

NOSTALGIA IN YELLOW

from page 57/56

spokes for the tie rod and the pushrod from the servo. The straight bellcrank mounted on the chassis midway between the servo and the front wheel is for adjusting the front wheel maximum throw to your turning radius preference.

The servos are mounted with double stick foam servo tape. The car has solid suspension, deemed best for ease of construction and the fact that the car was meant for smooth surface operation.

The bumpers, front and rear, are from the kit, with homemade stainless steel mounting brackets, bolted to the chassis for extra strength (plus federal requirement for ability to withstand 5 MPH collision with no damage.)

Larry estimates the total building time for the car was about 20 hours.

While the photos and the text explain Monogram's 1932 Ford V-8 kit, there are many models of new and old cars, trucks, and construction machines that all lend themselves to R/C operation. About all that is required is a model that can be made to steer without too much work and some provision for adding power to one wheel. If you have young boys in your family, you may have the needed vehicle on hand already. I think you will find this a fun project. It doesn't need a muffler or fuel and you can even run it in your living room when the weather is bad. Try that with your 8 pound pattern ship.

Lot's of luck! □

FOAM

from page 69/67

the front. Allow the fiberglass cloth to overlap the balsa about 1/4". It is not necessary to fiberglass the balsa but, if you think you want to spend the extra time fitting the cloth around the nose section, have at it. I never do. You will find that the rough edge of the cloth will disappear into the subsequent applications of glue and not enough additional strength is gained to warrant the expenditure of the time. Cut the excess cloth to 1" or so of the wing saddle, then snip the cloth perpendicular to the wing saddle outline each 1/2" or so. Apply glue to the foam in this area and fold these tabs in over the foam and allow them to stick straight into the equipment cavity. Do not make any attempt to fold the glass cloth in over the ply doubler on the inside of the fuselage or trim off the excess fiberglass cloth inside of the wing saddle. Your fuselage should now look like Picture No. 5. Allow the glue to cure completely — usually overnight.

The foregoing discussion sounds like a long drawn out process but actual working time on the last Hawk 460 fuselage I did was 35 minutes, start to finish. The waiting time is the only part of this process that takes a lot of time and during that time you can work on the wing or watch television, play with the kids, or whatever else turns you on. That last part will also help with the frau and get you away from the workbench a bit more.

When the glue has completely cured, trim off the excess cloth as close as possible with the scissors and sand the edge with medium to fine garnet paper to remove the rest and smooth the glue edge. Do not do much sanding — just enough to remove the cloth and excess glue that builds up along the edge. Mix another batch of Hobbypoxy II glue and brush a coat over the entire fuselage including the balsa and ply parts.

Do not brush glue on the vertical or horizontal stab if you want to Solarfilm or MonoKote there. In fact, I usually protect these balsa parts with a strip of masking tape at the fuselage join lines to avoid getting glue on them. If you are going to finish them using the Hobbypoxy glue method, go ahead and coat them right along with the rest of the fuselage. Picture No. 6 shows what your bird ought to look like now. Next, allow the glue to cure completely just as you did in the first step.

When you come back to go to work you will find, to your dismay, that your project appears to have been painted with a light coating of grease. Run to the kitchen and get your wife's dishwashing liquid (Ivory Liquid works best) and wash the glue down with a mild solution of this liquid — whatever it may be — then rinse with clear water. This is an important step — do not eliminate it.

Next, coat the fuselage and empennage, if you are coating the latter, with another coat of glue and allow to cure. By the way, each coat of glue should be as thin as you can brush it on. Heating the mixed glue helps to thin it and allows easier brushing and thinner coats. When this coat is completely cured, wash it and rinse it the same way you did coat No. 2. If you are Solarfilming or MonoKoting the flying surfaces, it is a good idea to apply the films prior to the last coating so you can mask off the edge of the film 1/6'' from the fuselage and have the glue seal the edge of the film. The canopy should also be glued on prior to the last coat of glue. You can sand an area that will be under the canopy and finish with enamel prior to gluing it on. Mask off the canopy before applying the last coat of glue. Pull the tape off as soon as you have brushed the glue on and remask it prior to painting. If you are finishing these surfaces with glue, then this step is unnecessary.

The last step is sanding. Use 80 grit garnet paper and sand the fuselage until it is smooth and any dimples disappear. Do a bit of final sanding with 180 grit No-Fil silicone carbide paper and you are ready to paint. I spray Hobbypoxy paint in 2 coats, sanding after the first coat with 180 silicone carbide paper but careful brushing will also produce a very creditable job. I always brush the trim color and mask with the cheap brand of 3M cellophane tape. The ''stays clear'' variety separates from the cellophane and is a real bear to get off the painted surface. The lead photo shows the finished model with Solarfilmed wing and stab, white Hobbypoxy sprayed on in two coats as indicated in the instructions, and Hobbypoxy black brushed on as trim. The black is edged with gold trim tape.

The result is a very handsome, very durable, model and the whole process was very easy to do. When you are finished with your Hawk 460, grab the fuselage and squeeze — you will be amazed at the strength. Then, gaze down the gleaming side of that sturdy fuselage. I think you will agree that you have produced the best fuselage you have ever done. □

NEW ERA III

from page 54/48

Hobbypoxy or resin and coat the inside of the engine and tank compartments and inside face of the chin sheeting. Install the rest of the chin sheet and lay the fuselage down right side up while the epoxy dries. This completes the construction of the fuselage which is now ready for final carving and sanding. We prefer not to shape the top block until the wing and tail surfaces have been completed as the square surfaces provide better alignment references.

COMPLETING THE WING:

1) Use 5-minute epoxy to install the 1/16'' plywood landing gear plates aligning with the rear edge of the top spar and lower surface of the ribs. Be sure to locate the plates properly. When dry, trim the balsa flush with the notch in the plates and check fit the trunnion blocks. File or carve a chamfer on the inboard edge of the slot in the trunnions to clear the radius on the gear leg before installing the trunnions. Epoxy the trunnions and the 1/4'' triangle reinforcements in place making sure that the bottom surface of the trunnion is flush with the ribs. Slip the gear leg in place and install the vertical block sighting from the wing tip to be sure the gear leg is perpendicular to the rib surface, and that both gear are aligned. Remove gear.

2) Drill a 1/8'' diameter hole in the bellcrank mounts and press in a #2-56 blind nut. Install bellcranks on the mounts and cut and bend ends and insert the 1/16'' diameter music wire aileron pushrods through the holes in the ribs. Insert the pushrod into the bellcrank and glue the mount between the ribs using the pushrod to locate the mount fore and aft. The aft edge of the mount should be flush with the ribs. Add the 1/4'' triangle reinforcements. Cut a slot in the bottom trailing edge sheet to clear the Nyrodapter link to the aileron horn. Note that this link is located in the middle hole in the bellcrank arm.

3) Install the 1/16'' ply servo rails and 3/16'' x 1/4'' reinforcements. Note that the forward edge of the rail rests on top of the bottom spar. Locate and mount the aileron servo and hook up the pushrods to the servo. We have found that using two Du-Bro solder links #112 modified by cutting off the pin side of one link and hooked together with the remaining pin is the easiest way to connect the pushrods. Check servo action now and be sure that the right aileron moves up on a right turn command. You don't want reversed aileron control with this ship!

4) Install the bottom leading edge sheet and the center section bottom sheet. Run a 1/8'' drill through the landing gear vertical block and bottom sheet to locate the inboard end of the landing gear slot. Cut the slot for the gear legs and cutouts for the retainers in the bottom sheet. Drill 1/16'' diameter holes for the retainer screws in the trunnion blocks. It's a good idea to pre-install the self-tapping screws now so that if the screwdriver slips it won't punch holes in your covering. Slot for aileron links.

5) Install the top center sheet trimming the servo cutout before installation. Trim the leading edge, spars, and sheet, flush with the tip rib and add the 1/4'' tips. Cut and install the forward and aft tip blocks. Install all cap strips. When dry, carve tips to final contour, shape the leading edge and sand entire wing.

6) Wrap the entire center section with fiberglass or nylon tape at least 2'' wide. Secure the tape with epoxy or resin. We used C/G 2½'' nylon tape and Hobbypoxy Quick-Prep on the prototypes. Since no dihedral braces are used to join the panels, this wrap is essential for proper wing strength.

7) Insert the leading edge dowel and position wing on the fuselage. Check the fit of the wing saddle and be sure that the wing is properly aligned in all planes. Drill through the wing and fuselage hold-down plate with a 5/32'' diameter drill aligned perpendicular to the lower surface of the wing. Remove wing and tap the plate #10-32 for the hold-down bolts. Use a 13/64'' diameter drill to enlarge the holes in the wing to clear the bolts. Reinstall the wing and check for proper alignment.

8) Trim the tapered tip on the ailerons and reshape the stock to a sharp trailing edge. Bevel the leading edge of the aileron as shown on the plans. Cut hinge slots and insert hinges. Note that the outboard hinge is trimmed down. Hold the ailerons against the wing trailing edge to locate the slots and slot the trailing edge. Temporarily install ailerons and check for free operation.

TAIL SURFACES:

1) Install the 3/16'' x 1/2'' anti-warp tips on the stabilizer, and shape tip contour when dry. Epoxy the 3/16'' diameter dowel joiner to the elevators using the trailing edge of the stabilizer for alignment. Bevel the leading edge of the elevator. Cut slots for hinges in the stabilizer and elevator and install hinges in the elevator. Insert hinges into the stabilizer but do not glue in place.

2) Use a razor plane to taper the elevator. Plane only one face then block sand using the stabilizer as a ''handle.'' Round tips and stab leading edge. By joining the stabilizer and elevator this way all edges can be blended easily and the risk of hinges poking through the surface is minimized. This technique also eliminates the bulges caused by inserting the hinges after covering.

3) Bevel the leading edge of the rudder and join to the fin as described above. Taper the rudder and sand all edges except the fin leading edge where it joins the dorsal fin.

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NEW ERA III

from page 75/48

COMPLETING THE FUSELAGE:

Before carving the top block, tack glue a 3/16" x 1/2" spacer in the aft end of the stabilizer and fin slots. These spacers will support the aft end of the top block during shaping and prevent the ends from breaking during handling.

2) Draw a centerline on the top as a guide while shaping. Use a razor plane or knife to slab off the corners of the top block and sides, then start shaping the contour. Follow the cross section on the plan for the proper contour. Block sand until the edge of the 3/8" triangle stock is just visible. Taper the aft top surface starting at the forward end of the dorsal fin following the side view of the plans. Round these corners smoothly. Shape the aft bottom sheet corners with a coarse sanding block since a knife will tend to gouge out the cross-grained sheet. Carve and sand the nose and chin area rounding the corners to fair smoothly with the nose ring and Former F-2B. Cover the engine intake and exhaust parts and wrap the spinner with a couple of layers of masking tape. Temporarily install the engine and use the spinner as a guide for final shaping.

3) Mount the wing on the fuselage temporarily and remove the spacers from the slots. Insert the stabilizer into its slot and sight from the front to check alignment with the wing. When satisfied, epoxy stabilizer in place, checking alignment in all planes very carefully. Slip the fin into the fuselage slot and seat firmly on top of stabilizer. Trim the lower surface of the dorsal fin to fit tightly against the top and glue to the fin. Remove from fuselage and shape dorsal top outline and sand contours into fin. Cut hinge slot in aft end of fuselage and glue fin and dorsal to fuselage and stab. Check alignment and be sure the fin is seated on the stab. Temporarily mount rudder and elevator horns and attach surfaces.

4) Check the direction of movement of your servos and lay out and install all pushrods. We used .062 diameter music wire for the throttle and nosegear running in 1/8" O.D. nylon tubing. The rudder and elevator pushrods used were Su-Pr-Line NyRods. Cut holes through the sides and F-3 to suit your installation. Be sure that the rudder pushrod exits through the left side.

5) Trim canopy base to roughly fit the fuselage. Wrap 120 sandpaper around fuselage and sand canopy for final contour. If you plan to add cockpit detail, make up the parts now and fit to the fuselage contour. A Williams Brothers 1½" scale pilot is the right size for this aircraft.

This completes the construction of your RCM New Era III. Go over the airframe again with fine sandpaper filling any dings or cracks with Dap or Hobbypoxy Stuff and you are ready to cover.

COVERING AND FINISHING:

We suggest that you assemble the whole aircraft and give all surfaces a final alignment check before starting covering. It's a lot easier to correct any problems before finishing the model. Check the landing gear alignment, saddle fit, wing and tail alignment once again and you will be confident of success on the first flight.

The secret of performance of this size model is light weight. Resist the urge to pile on a super finish with many coats of primer and paint. In our opinion the only way to finish your New Era III is with one of the plastic film coverings. Properly done, this will provide a beautiful finish with minor weight increase. The structure is very rigid and strong so any of the film coverings may be used.

Cover the bottom of the wing first then add the aileron horn links. Check aileron operation and cover the top of the wing. If using MonoKote, covering the tips with a separate piece will make the job easier. The bottom rear fuselage is covered first then a piece of material is applied to each side and wrapped around the top and seamed at the center. Complete the fuselage covering, then cover the tail surfaces and ailerons. Trim to suit.

FINAL ASSEMBLY:

Now permanently install all control surfaces and control horns. Make up pushrod ends and attach to control surfaces. Install tank and engine mount, all gear and wheels and connect the nosegear pushrod. Mount engine permanently and hook up pushrod to throttle arm. Position the radio equipment so that the completed model balances as shown on the plans. Install servo rails to suit, and mount the servos. Make up the inboard pushrod ends, check control movement and you are ready to go flying.

Insofar as the flying characteristics of the New Era III are concerned, these were covered in the introduction to the article. Use your normal check-out procedures for trimming out a new pattern ship and have at it! If you've built the New Era III according to the preceeding instructions, and without deviating from the plans, you'll find that it will far exceed your expectations for this size ship. In fact, we're willing to bet that its performance, coupled with its overall economy and ease of construction and transportation, will have you hanging that .60 powered pattern ship on the wall for a while.

Good flying. □

FLIGHT TRAINING SEMINAR

from page 38

that as you do, the tail will whip to one side and you will have to correct for it. Now, move the cyclic forward and the "dolly" will take-off across the parking lot at a surprising rate of speed. You may find that you will be going forward and to the right or left, while the tail is flipping to one side or the other as you advance or retard the throttle. At first, you'll find that it will be difficult to accurately and precisely control the movement of the helicopter across the parking lot since it will want to go in several different directions at once. Keep running tank after tank of gas through your helicopter until you can move it around the asphalt training area and make it go exactly where you want it to go! You will find that as you utilize this helicopter "dolly", you will soon be able to "drive" it around the parking lot in any direction that you want to — smoothly and precisely, whether it be backwards or forward or to the side, and that you can actually do Figure Eights, 360° tail rotor turn, and the like. In other words, you will be doing virtually all of the things that you will be doing in the air, except that you are safely on the ground where you will not cause any damage to your expensive helicopter. In fact, in the first few tanks of fuel, you can mentally note how many times you would have crashed your helicopter had you been in the air instead of on the helicopter "dolly". It is at this point that you will realize the potential and ultimate value of this training aid.

Keep working with the "dolly" until you can do exactly what you want to do at all times, one tank of gas after another. When you have a gallon or more through your helicopter, your rate of progress will be so rapid that it will surprise you. You, and you alone, will be able to determine when you are ready to actually stop using the helicopter "dolly" and be ready for your first test hops into the air. The only difference between "driving" the "dolly" on the ground and flying in the air is that you will be using a vertical ascent mode that was not possible with the "dolly". Beyond that, all movements will be the same except that it will take less control action to move the helicopter in the air than it did on the ground due to the weight of the training gear and the friction of the wheels against the asphalt or concrete.

So that's it for this month — try this remarkable training aid and stick with it until you are able to make your helicopter do exactly what you want it to do all of the time. At this point you will be ready for Part IV of the training course and your first initial flight with your chopper. □

DIRTY BIRDY

from page 35/32

The Dirty Birdy
Materials List

Whenever we've ever done any scratch building in the past, we've wished the building instructions would have included a list of the wood and such we'd need. After having spent several hours of listing wood sizes, checking sizes normally available at hobby shops and so on, we now know why they haven't done so. However, we've spent the time for the Dirty Birdy so you won't have to. Isn't that wonderful?

Following is a list of the materials you'll need. Because of the special sizes of some of the parts like the wing leading edge, and the stab leading and trailing edge for

example, you'll have to cut them from sheet or plank balsa. In checking the plans you'll also find that we've switched wood sizes in some cases because the wood size Joe has cut for himself just may not be available in most hobby shops. For example, the fuselage top block stringers are triangular stock with one point cut off to mate with the fuse side. We've used rectangular stock for the stringers. The plans call for 5/8" triangular stock up in the nose of the fuse. Try to find that stuff! 3/4" triangular stock works just as well and is available. The same is true of the 1/4" x 5/16" wing trailing edge stock. We used 1/4" x 1/4". To find the 1/2" x 1¼" x 12" beech hardwood you'll need for the motor mount rails, stop by a local lumber supply. Happy shopping.

Balsa Planks

1 ea. 2" x 4" x 10" — stab center rib filler block, spinner ring filler block, wing tip blocks.
1 ea. 3/4" x 4" x 36" — stab T.E., stab tip blocks, chin block, fuel compartment side blocks, motor mount supports.
1 ea. 1/2" x 2" x 36" — wing L.E.

Balsa Strips

4 ea. 3/8" x 1/2" x 36" — wing spar.
1 ea. 3/8" x 1/4" x 36" — top block cross braces.
2 ea. 1/4" x 1/4" x 36" — fuse vertical support braces, wing T.E.
1 ea. 3/32" x 1/4" x 36" — stab angle braces.
4 ea. 3/32" x 3/8" x 36" — wing capstrips.

Triangular Stock

1 ea. 3/4" x 36" — fuel tank compartment, motor mount supports.
3 ea. 1/4" x 36" — motor mount rails, rear fuse bottom, fuse wing hold-down plates, plywood wing fillet pieces, pieces behind bulkhead #2.

Aileron Stock

2 ea. 3/8" x 1/4" x 36" — ailerons, center section trailing edge pieces.

Balsa Sheet

1 ea. 3/8" x 4" x 48" — fuselage top block.
2 ea. 3/8" x 4" x 36" — fuel compartment top block, stab L.E., stab top filler block, sub fin, fuel compartment bottom, fin & rudder pieces.
1 ea. 3/8" x 3" x 36" — elevator.
1 ea. 3/8" x 2" x 36" — fuselage top block stringers.
1 ea. 1/4" x 4" x 36" — bottom block, bulkhead #3, wing fairing pieces.
3 ea. 3/16" x 3" x 36" — fuse sides.
1 ea. 3/16" x 2" x 36" — wing false ribs
1 ea. 1/16" x 2" x 36" — stab ribs.
6 ea. 3/32" x 4" x 36" — wing L.E. and center section sheeting.
6 ea. 3/32" x 3" x 36" — wing ribs.
4 ea. 3/32" x 2" x 36" — wing T.E. sheeting.

Plywood Sheet

1 ea. 1/4" x 6" x 12" — bulkhead #1 & #2, fuselage wing hold-downs.
1 ea. 1/16" x 6" x 12" — wing hold-down plate, spinner ring, main gear brace pieces, dowel support pieces, rudder horn insert.
1 ea. 1/32" x 12" x 24" — servo compartment doubler, wing fillet base pieces.

Hardwood

2 ea. 1/2" x 1¼" x 12" — (beech hardwood) motor mount rails.
1 ea. 1/2" x 1/2" x 12" — (hardwood) servo mount rails, main landing gear support gusset.
2 ea. 5/8" x 1/2" x 12" — (notched hardwood) landing gear support, landing gear support torsion block.
1 ea. 1/4" x 12" — (hardwood dowel) wing front hold-down.

Miscellaneous

1 ea. nose gear steering arm
1 ea. nose gear bearing
1 ea. nose gear
1 ea. 5/32" piano wire
1 ea. Dirty Birdy canopy
6 ea. landing gear straps
1 set aileron torque rods
3 ea. horns
1 ea. Sullivan 14 oz. slant face fuel tank
1 ea. 2¼" hard rubber wheel, nose gear
2 ea. 2¼" soft rubber wheel, main gear
2 ea. pushrods
3 ea. clevis and rod assembly, nosegear steering and throttle linkage

DIRTY BIRDY

Designed By: Joe Bridi

TYPE AIRCRAFT
Competition & Sport
WINGSPAN
64¼ Inches
WING CHORD
11" (Average)
TOTAL WING AREA
688 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Swept L.E.
DIHEDRAL
3/8"-center with wing inverted
O.A. FUSELAGE LENGTH
55¾ Inches
RADIO COMPARTMENT AREA
(L) 13" X (W) 3" X (H) 2¼"
STABILIZER SPAN
27½ Inches
STABILIZER CHORD (incl. elev.)
7¾" Average
STABILIZER AREA
212 Square Inches
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
10" incl. sub fin
VERTICAL FIN WIDTH (incl. rudder)
9 Inches Average
REC. ENGINE SIZE
.61 cu. in. (10 c.c.)
FUEL TANK SIZE
12-14 Ounces
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
4 (5 with retracts)
CONTROL FUNCTIONS
Rudder, Elevator, Throttle, Ailerons
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa and Ply
Empennage ..... Balsa
Weight Ready-To-Fly ..... 128 oz. (dry)
Wing Loading
20.5 Ounces
(includes wing and stab area)

SUNDAY FLIER

from page 22

There's a lot of other things you really should have checklists for — like charging batteries, for instance — but I just haven't gotten around to it after all these years. And that's why I still qualify as a Sunday flier, I guess.

These last two incidents led me into recalling some of the other dumb things I've done through the years. The list is almost awesome, although I haven't as yet done the one thing that nearly everybody has heard about. I'm referring to that old story about the guy who was about to hand launch his plane after making sure eveything was working okay then proceeds to run into the wind, with the transmitter in one hand and the plane in the other, then throws the transmitter into the wind and tries to control it with the plane. Some guys swear that really happened.

Maybe. The closest I've ever come to that is to launch the plane with the receiver turned off. That's embarrassing enough, but even more embarrassing is to launch the plane with the receiver on, but the transmitter off, yell "I ain't got it!" and then have some guy standing near you say "Turn on your transmitter, dummy!" Believe it or not, both those things have happened to me.

I wonder how many of you have also done what I did once — rush to get out to the field in the evening before it got too dark — only to arrive and find that you left the wing at home. And the reverse; fly a couple of flights, pack up your gear and go home, only to find that you left your plane at the field — or your toolbox. I've done both; a couple of years ago, at the Pioneers' WW I Jamboree, I even left my SE-5 at the field. Considerate members held it for me — but I did take quite a ribbing. Deserved it, too.

One of the wildest flights I ever had was when I was flight testing the prototype Wavemaster. We made a lot of flights with different height steps, to get the best possible lift-off. To keep from having to make a lot of hulls, we made one with a relatively small step, then we had molded plastic pieces which faired into the bottom of the hull and gradually increased the height of the step. They were held on with waterproof tape. The idea worked great;

make a take-off, fly around, make another, land, change the plastic step modification, and try again.

During the tests one day, I was carefully checking the lift-off as I experimented with various step heights. After several flights, I noticed the plane seemed to have developed a strange characteristic; if the nose went up, it kept going further up, even without help. But if the nose went down, it would start to tuck under. Boy, that worried me. Did I have a drastically unstable airfoil? Nah, couldn't be. Maybe it's that real steep step; I've gone beyond what is really needed, and just wanted to make sure. So, I landed in the water, taxied back to shore, and changed steps back to the one that previously worked very well. Refueled, taxied out, and took off. Perfect. Fed in a bit of up, and zowie, up went the nose. Wow! Put in down. The model came up over the top, nosed down, and went into a violent tuck under.

Well, after porpoising all over the sky, I managed a lucky landing and taxied back to shore.

Everything was working perfectly, but I decided to take the wing off and check, anyway.

The minute I got the wing off, it was

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SUNDAY FLIER

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apparent that your old chief Sunday flier had done it again. The bottom of the hull was loaded with about ten ounces of water! With only the one partial bulkhead, the water was relatively free to run from nose to tail — and that's what it was doing in flight. When the plane nosed up, the water ran back to the tail, making the model tail heavy and thus nosing up even more. Then, when down elevator brought the nose down, the water ran to the nose, making the model nose heavy. Moral? When you're flying seaplanes, check regularly to be sure water isn't getting inside. You can see what a problem it can be. Could be worse — the radio could have gotten wet, and that would have ended it all. As it so happens, I mount the receiver and servos about half way up from the bottom, so that's why they didn't get soaked.

Here's another beauty. Some time ago I had a small flying boat with half-A power, and the engine pylon was mounted on the wing. Not having read the instructions, I had mounted the engine pylon, very firmly, using Titebond! The first flight was great! Let's go again. Midway in the second flight, the engine pylon let go, as the Titebond was dissolved by the water. Fortunately, the floatation of the pylon was greater than the weight of the engine, so I recovered it. And, since the engine was above the wing, when it let go, it didn't affect the balance so much but what I was able to land the plane. But I sure felt pretty sheepish. Wouldn't you?

Here's one for the old-timers. Bet most of you have done it too. We used to fly using escapements for control. Power for the escapement was a wound-up rubber band. Everytime you gave a command, the rubber band would unwind a turn. So, after each flight, you'd rewind the escapement rubber. Unless you forgot. And what would make you forget? Most any distraction, but one of the commonest was to land, relax, and wait your turn for the next flight. Came your turn, and in your haste to get going, you'd forget the unwound rubber, and midway in the flight, air pressure became stronger than the torque of the rubber, and the escapement would hang up. After a couple of experiences like that, I finally got into the habit of rewinding as soon as I landed. But only after a couple of "object lessons" and repairs.

One that can still happen is to forget to put enough rubber bands on your wing when it is mounted in the old classic method of wing dowels and bands. There's an old saying — put on enough, then add a couple more for safety. It usually works. But what happened to me wasn't due to having enough when I thought of it. I got out to the field with one of my small airplanes, which I could carry in the car all assembled. But, I had only put it together for convenience, and just had **one** rubber band on each side of the fuselage. By

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WHEN WRITING TO RCM, DON'T FORGET TO USE YOUR ZIP CODE!

SUNDAY FLIER

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chance, I had a clear frequency just as I arrived, so I rushed to get in the air — and forgot to put on the regular number of bands. The plane took off all right, with only one G-load.

When I got some altitude I decided to do some "showboating" with my four position escapement (yes, it was that long ago, but I haven't forgotten) which had down elevator as well as "kickup." So, I gave it down and it started to pick up speed. Suddenly, with no help from me, the plane jerked up violently, stalled, dived, picked up speed, did it again, and then again. Naturally, the clarion call "Interference!"

It wasn't, of course. When the speed picked up, the wing would lift off the fuselage at the leading edge, quickly increasing the angle of attack and the lift, and pull the nose up. That was one of the greatest roller coaster flights I've ever had. Luckily, the rubber bands were fresh, at least, and didn't break under that added tension. Naturally, after gingerly getting the airplane into level flight, I continued until the engine quit (no engine control) and glided to a landing. Never did let on to the rest of the guys how dumb I was.

Well, those are some of the things I've done. Here, without going into detail, are some others:

Cleaned an engine thoroughly, then went out to the field to fly, only to discover that I left the needle valve at home.

Just plain forget to charge batteries.

Launched a model with a Golden Bee engine — running backward.

Stepped on the foot switch for a glider winch accidentally, got too much tension in the line, snapped the plane into the air with excess speed and folded the wing.

Shorted the exposed terminals on a battery pack, starting a fire in the battery compartment.

And there were more, but that's enough for now.

As you can see, now, when you write to me and ask me for an opinion, you can figure you're asking an "expert" — because I've made so many mistakes over the years I've got a big file to refer to. Also, for what it's worth, you don't have to feel bad when you do something dumb — you're just one more step on the way to becoming an "expert."

Of all the things I've noted, some of them could be rationalized as not entirely my fault — like, chargers really should have a light on them. But the one thing I did that was really all my fault was not to check my seaplane for water accumulation. There was no need to hurry, no pressure to take a turn — just carelessness, really.

Dumb. Did you ever do anything dumber?

Let me know. I'll award a year's subscription to RCM for the best letter.

Unless it comes from Don Dewey. □

When writing to an advertiser be sure to mention that you saw their ad in RCM.

CUNNINGHAM ON R/C

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of the forward movement of the CG. It is much easier to fly a groovy bird, than one that wants to hunt in the turns. If you have one of these, check your CG — I'll bet that it is too far to the rear.

Big deal! So now, we have discussed where the CG is located, and a bit of why it is located at that general point, so now the question rises, how do I go about determining where it is on my aircraft; what is the correct location, and how do I find the correct location if my aircraft has a rectangular wing shape, or a double tapered wing, or a swept leading and trailing edge? How about a biplane — how do I locate the CG on a double winger, or a triple winger, for that matter?

Let's assume that, for our purpose, we are going to locate the CG at 30%. What does this mean? Simple, it means that 30% of the total wing area is ahead of the CG, and 70% of the wing area is behind the CG. You cannot look at the center rib of the wing and measure back 30% and call this the CG unless you have a wing that has a rectangular planform. Lots of aircraft do have a rectangular planform, and you are right at home by locating the CG at 30% of the center section but, if your aircraft has a tapered wing, you simply cannot work from the center section.

Take a look at the drawings. Figure 1 shows the normal rectangular wing. Figure 2 shows a wing with a swept leading edge. If it is a straight sweep, then you can add the root chord dimension to the tip chord dimension, divide by two, which gives you the average chord. Then find the point on your wing that corresponds to this average chord, measure back from the leading edge 30%, and then extend this location parallel to the trailing edge to the center section and this will give you the balance point. The same is true if the trailing edge is swept forward, and the leading edge is straight.

Or, you can make a scale drawing of your

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wing, like Figure 2, divide the wing half span in two (this will give you the average chord) measure back 30% on the average chord, extend this line to the center, measure back from the leading edge of the center section, and this gives you the point.

For more complex wing planforms, look at Figures 3 and 4. The drawing is the same for each, although Figure 3 is a double tapered wing, and Figure 4 is a wing with both swept leading and trailing edges. Make a scale drawing of your wing planform, then add the measurements for tip and center section as shown. Connect points ABCD with a line and, where the line crosses, draw

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a line parallel to the root chord. This is the location of the average chord. Then, you can measure back 30% from the leading edge to locate the CG. Extend this point to the center of the wing drawing, and this will give you the point to balance your aircraft on your sweaty finger.

Many times, with a swept wing aircraft, this CG line, extended toward the tip of the wing, will simply dive off into space, so you cannot pick the aircraft up and balance it by the wing tips. With a scale drawing you can find the place to locate your stubby fingers, or a balance jig can be used to locate the correct position before you put your bird into the air. I'll bet that an improper balance point has caused more crashes than all of the radio malfunctions put together. Be careful, take the time to locate it correctly, and let your aircraft live to fly again next weekend.

Now, how about a bipe? I was asked this question just the other day. To begin with, assume that both the top and bottom wing are one wing, with a total chord width of the total horizontal distance from the leading edge of the top wing to the trailing edge of the bottom wing. (Figure 5.) Measure back 30% from the leading edge of the top wing and you have the CG. Now, if the top wing is swept to the rear like an Aeromaster, simply make a scale drawing of the top wing, look at Figures 1 through 4, locate the average chord, measure from the leading edge of the average chord to the trailing edge of the lower wing, locate 30% of this point, and this is the correct CG location.

Now that you have discovered the rather easy secret of locating the correct CG, how about building your aircraft so that you don't have to get it to balance at this point with a lot of lead. Lead really doesn't add anything to the strength of the aircraft, and may do a lot of damage in case of a crash. So it would be wise to build the aircraft's tail light, the nose strong, and then shift the radio and batteries about in the inside of the semi-finished aircraft until you locate the correct balance point. Of course, once you

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strap the wing in place you will change the CG just a bit because the wing will have 30% of its area ahead of the CG and 70% of its area behind. But, the weight of the forward 30% is probably about equal to the weight aft, as the construction of the leading edge section is usually much stronger. Always make sure that any weight that you add (and that includes batteries) is properly wedged and braced in place so that it will not come loose and bash around the guts of your airplane.

While on the subject of balance points, a balance that is often overlooked is the balance along a line running between the center of the nose of the aircraft and the center of the tail of the aircraft. Quite often one wing tip will be heavier than the other, and this will cause the aircraft to fly in a rather weird way. Check the balance of your wing, and if it is goofed up, add a bit of weight to the light wing tip until the aircraft balances both ways, on the CG and along the center line. And, don't forget — a side mounted engine with muffler will also add weight to one side.

One last parting thought for this month. Not long ago one of my old friends, Bill Slater, was having a lot of trouble with his new Super Kaos. It simply would not track straight through loops, and it wanted to wander off of a straight line in level flight. Lots of people brought forth ideas as to what was the matter, until finally Gerry Krause (The K of EK Radios) took a good look at Bill's aircraft and discovered the problem. Bill, a really excellent builder, had somehow managed to sand a different leading edge radius in one wing panel from the other. In a slow flying aircraft this would not have made much difference, but in a fast aircraft one wing panel had more lift than the other, and this led to the squirrely flying characteristics of this model.

It's the small things that can come up and bite you in the rump just when you think that you have this business down pat.

Good luck, good flying, and take time to check the balance — it's important! □

ENGINE CLINIC

from page 10

hobby shop and the guy said I was burning too much oil. (I was using 15% Baker's AA castor). He told me to decrease the oil content 7 or 8%, so I did. To add a little punch to the fuel, I increased the nitro content to 30%.

The next time I flew, I used this mixture. It worked great until the engine stopped. I just missed crashing the plane into the goalpost on a deadstick. Anyway, I went to restart the engine and it was frozen. I couldn't budge it. Shall I try less oil or more nitro (might be too expensive). Please advise me.

The model engine has yet to be made that can operate on the fuels you have been running. You should not have condemned the McCoy .40 because the problem was of your own making. Model engine fuels require a minimum of 18½ oil and this, generally, only for racing engines turning at high rpm with small props. Sport fuels should contain a minimum of 20% lubrication with 22% being preferable. For breaking-in a new engine 25%-28% lubrication should be used. As you started out with 15% and went to 7%-8% you went from bad to worse. It is hard to believe that any hobby shop would recommend the use of 7%-8% oil. Your hobby dealer must specialize in crafts rather than powered models and have no knowledge of model engines. One has only to look on the labels of many of your commercial fuels to see the oil content they contain.

As for the ugly blue streak — this is normal and something you will have to put up with as all of us do. With a fuel containing the proper amount of oil you are going to see a smoke trail and there is no way of getting away from it.

With your engine frozen up it is too late to do anything other than return it to Testors/McCoy for rebuilding. When you get it back use a fuel with 22% lubrication!

Dear Sir:

First, I'd like to introduce myself – I'm the associate editor here at Butane-Propane

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News, and a fan of your magazine (whenever I can get a hold of a copy). I was rummaging through a stack of miscellaneous junk that always seems to get piled on my desk and, lo and behold, I found a treasure – a copy of your May '74 issue. So, I glommed onto it and have been furtively sneaking looks and drooling a lot.

The real reason for this letter is because I was suddenly hit with a flash of inspiration. Has anyone, to your or any associates knowledge, adapted a glo-engine to LP-gas? I would think that one of the helicopters would be a natural for this, using a a small disposable tank as is used for small cutting torches. Think of the improvements in emissions, etc.

Anyway, I just finished an article on an inventor who has been injecting propane in addition to diesel fuel into a diesel tractor. I watched the dynamometer myself – at the same rpm the HP was 160 on straight diesel, and it jumped to 203 HP when 25% propane was added. There was an increase of 100° in stack temperature.

I would be interested in hearing if anyone has done anything along this line, it would be of interest to both magazines.

Sincerely,
Richard Dougall
Arcadia, California

Our model engines could be run on Propane if it weren't for the same problem as in the preceeding letter — lubrication. The oil must be mixed with the fuel and this could not be done with the pressurized propane bottles. Oil would have to be injected into the intake from a separate source which leads to more complication than the effort justifies.

Dear Clarence,

I started with engine powered model airplanes about a year ago, after watching them with fascination since the late 30's. When I was a kid, a 25¢ rubber band powered model was a big deal. (Run of the mill were 10¢). My first engine was an O.S. Max .35 in an Andrews A-Ray, which turned out to be a fine engine. Thanks to following your advice in "Engine Clinic" and the R/C Engine, it now hums like a .45

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in an Andrews Trainer Master.

I have also flown .049 Cox and Veco .19 with good success. My problem is with an Enya .09.

The Enya seemed very loose, when I took it out of the box. It didn't have the feel of compression like all my other engines. I ran a quart of Fox Superfuel through it before installing it in the airplane. At that time it seemed a little tighter, but still no compression. I successfully flew it through about 1/2 gal. of 25% nitro fuel, and then about 1/2 gal. of 15% nitro fuel. It would never start by hand, but would start alright with the electric starter. The engine seemed to get gradually tighter. The engine was so tight yesterday it would hardly start. I worked with it for about 1/2 hour and finally got it going. It will run and still flies the airplane, but it is so tight it will not idle.

The tightness seems to be in the shaft, rather than the piston.

Do you think this is do to varnish in the engine?

Why did the engine never develop a feeling of compression when turned by hand?

What have I done wrong?

What should I do now?

Sincerely,
Dale R. Johnston
Petersburg, Virginia

Unlike ringed engines that do develop better compression with running as the ring/rings seat, a lapped piston engine should have good compression to begin with. If not, it is due to an out of round piston, sleeve, or both. Very seldom can this condition cure itself with additional running. The high spots wear off but the compression seal will always be bad. When you purchase a lapped piston engine be sure the compression is good to begin with as chances are nil that it will improve with running. Sometimes running will loosen up a tight engine so that the compression will feel a little better but in actuality it is not.

As for getting tighter with running — this could be caused by varnish build-up between the piston and sleeve but, as you note, it seems to be in the lower end, and I would guess that the crankshaft siezed in the

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ENGINE CLINIC

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bearing at some time and has galled either the shaft, bearing, or both. Usually bearing material will fuse to the crankshaft. This can be cleaned up with emery paper and it is the bearing that suffers the main damage. Often they can be salvaged by the use of a piece of #360 emery paper on the end of a drill or wooden dowel. However, unless one is experienced in engine rework it is better to leave things of this nature to those who do. It would be best to return your engine to MRC for servicing.

Dear Mr. Lee;

I am attempting to re-work my K & B 40 rear engine so that I can develop a little more power. This is a series 71 engine.

I notice in your book on R/C engines that you recommend that .015" be shaved off of the head and this should be done with a two or three degree angle. Could you please tell me which way the angle goes? I can only assume that the angle is at its high point where it sits on the sleeve. Is this correct? What is the purpose of shaving the head at an angle? Also can .015" be taken off without any problem other than having to deepen the slot for the piston baffle to fit? I am asking this since a machinist friend of mine who is going to do this for me believes that .015" is quite a bit. I am going to use the engine with a straight FAI fuel (no nitro).

Best regards,
V.A. Bird
Canada

First I would like to make clear that the removal of .015" from the head was for the use of FAI fuel **only.** If the engine is to be run on nitro the heads should be left alone.

The 2°-3° angle with up to 4° is okay towards the combustion chamber recess or center of the head. The idea of the angle is to force the fuel mixture towards the center of the combustion area creating turbulence resulting in increased power. The stock nitro head, as supplied on the engine, already has a 2°-3° taper and you have only to look at this correct direction of the angle.

After removing the .015" from both the squish band and gasket surface of the head and a like amount from the baffle slot you will have to re-contour the shape of the baffle slot to match the baffle contours of the piston with a file.

The .015" is not excessive. In some cases even more can be removed but .015" is a safe figure. More than this can result in a very critical and touchy needle valve.

Dear Clarence,

In the November issue of "R/C Modeler" you gave a list of materials (aluminum, bronze, cast iron, etc.) to be used in the construction of engines. Where might these material be purchased?

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QUARTER MIDGET

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remainder is methanol. They use reworked Cox gray plastic props that have been shortened and narrowed and the engines turn over 20,000 on the ground with reworked 5½/4 props. They also use a flying start like with sailboats, that is, all the airplanes are launced and must anticipate the starter's green flag to start the race. An early start is a lost lap. The Seattle Group has averaged 12 to 15 active flyers for most of the races and seasonal points are accumulated.

★ ★

I also received a letter and set of rules from John Dunn of Mentor, Ohio for the MARCS 1/2A Pylon races. The MARCS also race monthly and Ed Nobora has donated a trophy for the seasonal high point winner. The MARCS follow the RCM rules except that they fly by times rather than points. They also use only ACE constant chord foam wings. John gave me some plans for two 1/2A racers that I will try to redraw for later presentation here.

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YOU ARE INVITED TO BECOME A MEMBER OF

NRCHA

NATIONAL RADIO CONTROL HELICOPTER ASSOCIATION

Sponsored by R/C Modeler Magazine, the National R/C Helicopter Association has been established to promote and encourage active participation in sport and competition R/C helicopter flying. It is a vehicle whereby the R/C helicopter builder and flier will have a forum from which to discuss various ideas, helicopter competition rules, and provide a communications media with which to assist the Academy of Model Aeronautics in future programs in conjunction with helicopter contests. The organizational structure is very similar to other established organizations within the R/C framework such as the NSRCA for pattern fliers, the NMPRA for pylon racers and the LSF for sailplane pilots and will be structured in such a fashion as to promote helicopter activities within the existing governing body for all phases of model aviation, the Academy of Model Aeronautics.

As mentioned, the primary purpose of the NRCHA is to encourage the dissemination of information between R/C helicopter pilots as well as to establish and create a self-improvement and achievement program similar to that utilized by the League of of Silent Flight. A five step Grade Level Proficiency Program has been established with gold proficiency pins awarded for each grade level you complete successfully.

The Association is a non-profit organization whose administrative and clerical details are handled by the R/C Modeler Magazine staff on a gratis contributory basis. Membership dues have been deposited in a separate account in the name of the organization and those dues are used for actual expenses of membership cards, and physical materials necessary for the initial operation of the organization. A full accounting of all funds will be made on a periodic basis and will be certified by a public accountant. Additional funding has been donated by R/C Modeler Corporation.

As a member, you will receive a membership card in the NRCHA and will be assigned a registration number which you can use on your helicopter which will consist of the letter N followed by a number issued on a first come, first serve basis followed by a letter designating the district in which you reside. These registration numbers will not only serve as an indication of your membership in the organization, but will enable the model magazines to be able to identify the owner of a helicopter in contest photographs by simply checking the organizational file for the individual membership card bearing that number. As a member you will also have the opportunity to associate with individuals across the continent whose interest in the hobby parallels that of your own. It is our hope that each and every one of you will participate in any degree possible within the organizational structure, contributing ideas, building information, flying tips, and/or working and serving on the various committees that will be established in the future. Any assistance that you can render will be appreciated by each and every R/C helicopter pilot in the country. The annual dues have been established at $4.00 per year to cover postage, printing, etc. All additional costs will be absorbed by R/C Modeler Magazine.

YOUR DUES WILL EXPIRE 12 MONTHS AFTER DATE YOU SEND IT IN. YOU WILL BE BILLED 1 MONTH PRIOR TO EXPIRATION DATE.

MEMBERSHIP APPLICATION

NATIONAL RC HELICOPTER ASSOCIATION
R/C MODELER MAGAZINE
P.O. Box 487
Sierra Madre, California 91024

Date _____

NAME _____ AMA # _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

PLEASE FILL OUT THE ABOVE AND ENCLOSE $4.00 FOR 1975 ANNUAL DUES —

FOREIGN DUES $5.00

QUARTER MIDGET

from page 120/6

The following is a reprint from the Long Island Radio Control Society's Newsletter "Low Passes" with which we agree:

"Since its inception the RCM rules for 1/2A RC pylon racing has stipulated a minimum weight of 20 ounces. I found out, to my surprise, that our own club has disregarded this rule in favor of "anything goes." Several members have constructed racers under 17 ounces already. Since the RC equipment and engine are fixed weights, obviously the structure portion of the plane is getting rather "thin." This type of rule could prove dangerous. What we **don't** *need is a structural failure in flight causing a racer to destroy itself in a crowd of spectators. Even a one pound weight at 60 mph could prove to be a lethal weapon. I hope our Contest Committee does an about face on this portion of the rules."*

Don and I both believe 1/2A racing should take the form of whatever type of racing a club or area group decides rather than to try and make a single official event. For this reason we will present the various types of 1/2A racing being flown. We are seeing wide open types and very conservative types of racing as well as everything in-between. The best part is that all participants are enjoying racing. Because of the non-limiting engine, propeller and fuel portions of the original RCM 1/2A Pylon Racing rules, we at RCM felt another more definitive set of rules might be of use. The Quickie 200 rules presented in this issue could easily be applied to a more scale-like event if desired. The Quickie 200's are an easy and equitable way for a club to begin Pylon Racing.

RACING CALENDER

June 1 — QM, Lebanon, PA, KRCS
June 7 — FI, Bowie, MD
June 7,8 — FI, Whittier Narrows, CA, San Gabriel RCL
June 8 — QM, Bowie, MD
June 15 — 1/2A & SP, Centerville, VA, NVRC
June 21,22 — FI, Sepulveda Basin, CA, Valley Flyers

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I started running tests with an integrator that measured the amp-hours that I put into the battery. I also recorded the charging current vs. time and did some mental calculations to see if the integrator was working properly. The thing I noticed was the curve always looked pretty much the same and the current dropped to a value between 1.0 and .5 amps when the integrator said that I had put in 500mah or 100%. The next thing to do was to see how a partially charged battery responded. I charged a battery with the C/3 charger and then took out exactly 250mah. I then charged it with the fast charger and lo and behold when I had put the 250mah back in, the current had again dropped to a value between 1.0 and .5. This would tell you that all you had to do is build a charger with a voltage regulator, a current limiter, and a meter so you could unplug it when the current got down to .5 amp. This is essentially what we've done but it isn't quite that straightforward to use.

First of all the current vs. time curve and, therefore, the current at the 100% point, changes with temperature. The other thing is that batteries vary and, in fact, some brands have a high internal resistance that never lets the current get much over .5 amp with 6 volts applied. I know this technique works well with GE cells and poorly with Gould cells. It does not depend on special "quick charge" or "power up 15" cells but should not be used on button cells that do not have a pressure relief valve, in case you do walk away and forget to unplug the charger. The risk of actually venting the cells is pretty low however, because the current keeps going down as the battery becomes charged, so there is a large safety factor. We have left a 250mah pack on the

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charger for an hour without hurting it. In fact I don't know of anyone destroying any batteries with these chargers and I know there have been over 100 in use over the last year and a half. There is a greater tendency not to charge enough. Low temperature and high internal resistance batteries cause the current to drop faster so that you reach .5 amp in a shorter period of time resulting in an incomplete charge. Here is where you must make some mental calculations as well as know something about the state of charge of your cells. If you charge your batteries one day and don't use them, then charge again, it would not be unusual for the current to drop to .5 amps in one or two minutes. But if you flew five flights of 12

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RADIO SPECTRUM

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minutes each you know you took out approximately 250mah, assuming an in-flight drain of 250ma. So if your fast charger current drops from 2.5 amps to .5 amp in 3 minutes, you probably averaged about 1.0 amp, and only put in approximately 1.0 amp (ave.) x 3 min. x 1 hr./60 min. = .05 amp-hrs or 50mah which is 200mah short of what you took out, so your battery is not charged quite as mush as you would like it to be. This could happen at low temperature or with high internal resistance batteries (or a faulty charger), and it is important that you can recognize this situation. If these calculations are too tough for you, then maybe fast charging is not for you.

The fast charger can be used in cold weather but it will take a little longer and you can't use the charging current to indicate when you've reached the 100% level. Just remember you can't get out more than you put in, so try to estimate what you took out and then put the same amount back in. The curves in Fig. 1 might help. Find the time you flew in the upper left and move across until you get your in-flight current drain (See April '74 Radio Spectrum column). Move vertically down to find out how much you took out of the pack. Keep going down to what your average charge current is and go horizontally to find out the required charge time. Using the example we used before, five 12 minute flights (60 minutes) with an in-flight drain of 250mah, we see we pulled out 250mah. If your average charge current is 1.25 amps, it takes us 12 minutes to recharge. Leave it on for 15 minutes to be sure. You can leave it on for longer without hurting it, but there really is no need to get it 100% full. If you check your batteries with your expanded scale voltmeter battery tester (you acquired a few months ago) after every flight, you can give it another fast charge whenever it gets down to where you think you're on the last 25 to 30% of the capacity. Using this procedure you could literally use the batteries from dawn to dusk. Another benefit, as GE suggests, is that you could go to a smaller, lighter battery in your glider or racer and cut out that couple of ounces that are making you uncompetitive. We've had excellent results with 250mah GE cells with an airborne pack weighing only 2.5 ounces. Notice that the capacity of the cells becomes relatively unimportant when you have a fast charger. What you look for is a **charge acceptance.** You could probably use 100mah cells in a racer if the internal resistance was low enough. So far the 250mah look like the smallest that are usable.

You may say this all sounds too complicated and it probably does, because it is pretty hard to write down, but luckily nothing is very critical.

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First, let's talk about the chances of overcharging, which could cause the cells to vent and eventually shorten the battery life if it was done long enough or often enough. The thing that makes this unlikely is that most people are impatient by nature and, once they find out they can fly 5 flights after a 15 minute charge, they won't charge for another 20 minutes in order to get a total of 6 or 7 flights. The other thing is you can go to about 30% overcharge before you will start approaching dangerous pressures. When the current is less than .5 amps, this means you could leave them on another 20 minutes after reaching 100% charge. As you can see, under normal conditions there is a large safety factor.

At high temperatures you must be more careful because the current will not drop as low, so it doesn't take as long to reach the 30% overcharge. However, once again, if you charge for 15 minutes after every 5 flights you should be safe. You say, "why not put a fifteen minute timer on the charger, if that seems to be a 'nominal' charging time?" You could, but then some guy might think that it is always acceptable to charge for 15 minutes. There are some extreme conditions, such as high temperature (over 100°) and a battery that is already fully charged, where another 15 minutes might cause trouble. This would be a rare occurence though, where you would forget that you had already charged. So if you want, go ahead and add the timer.

What about undercharging? If you charged for 15 minutes and averaged only .5 amps you would still be putting in a 25% charge which would be good for more than one flight. If you are checking your batteries after each flight with your expanded scale voltmeter you would see after one flight that you are getting low. Notice that the E.S.V. won't tell you the state of the charge immediately after charging. So with the right equipment, you ought to be able to fly all day and not worry about your batteries.

There have been many items coming out that tell you when your batteries are getting low, but now you've got an item that will allow you to do something about it, without making you quit for the day. Once you get used to fast charging you'll wonder how you got along without it.

Fast Charger

As I mentioned before the fast charger is nothing but a regulated power supply and there are many that will do the job. Fig. 2 shows my original schematic which was built with discreet components a couple of years ago. There are various integrated circuit regulators available now, but the circuit shown is pretty simple and can be built from parts most guys have in their junk box. The only thing that might be considered critical is the series regulator

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transistor Q, which must pass 2.5 amps and be capable of dissipating about 30 watts, which means it must be mounted on a heat sink. I used a Darlington transistor which takes the place of Q_1 and Q_2 but separate transistors will work. Q_2 should be capable of at least 300ma collector current. The way the circuit works is as follows: Q_1 acts like a valve which controls the amount of current that flows. The 1K pot is across the output and senses the output voltage. The voltage at the wiper is proportional to the output voltage and is compared to a reference voltage generated by the zener diode. If the output is higher than the pre-set level, Q_3 conducts more and Q_2 less which, in turn, causes Q_1 to conduct less, therby reducing the output voltage until equilibrium is reached. Q_4 and the .25Ω resistor are the current limiting circuit. When the current reaches 2.5 amps, the voltage drop across the .25Ω is .625 volts which turns Q_4 on. This takes the base current from Q_2 which turns off Q_1. The resistors provide bias to the zener and transistors.

I chose a 3 amp meter, because I noticed that on good batteries the current was less than 3 amps within a few seconds and I wanted to be able to read fairly accurately when the current got down to .5 amps. If I didn't limit the current and used a 10 amp meter to measure the initial surge I wouldn't have much resolution down around .5 amps. The .25Ω resistor is made from nichrome wire and the actual value which will give you a 2.5 amp maximum is somewhat dependent on the base emitter threshold of Q_4 which will change slightly with temperature. It is not critical as long as you don't pin your meter.

This whole thing may sound like I invented fast charging but I assure you I didn't. The first time I saw this "constant potential" method used was to charge nickel cadmium batteries in missiles back in 1955. From the sound of at least one letter I received I guess I wasn't the first to apply it to R/C battery charging. Dick Lee of Canoga Park, California, built a similar charger at least four years ago and built 8 of them for his friends, with no problems. Dick's original charger had panel controls which allowed the operator to manually adjust both voltage and current. As the battery came up, the voltage had to be adjusted. Dick is now working on a fully automatic charger which would have no knobs and no switches. When he has it perfected, I'm sure he will share it with us.

Astro Flite has been fast charging the nickel cadmium power packs they use to power their electric planes quite successfully. Their chore is a little easier because they always start with discharged batteries. However, it is also harder because their batteries get hot during discharge and one should really not try to fast charge when the batteries are hot. They also manufacture

a charger to charge your R/C batteries and it includes a 15 minute timer. It requires a 12 volt battery to charge the 9.6v transmitter batteries and a 6 volt source to charge the 4.8v airborne battery. The current limiting is supplied by the resistance of the wire between the batteries. Astro Flite is now working on a new charger with a built-in tester. They plan to test the battery by putting a very high load on it and monitoring the current.

S & O RC Products has been marketing fast chargers for over a year and the users are very happy. Clarence Lee and his son Jack fly an S & O in their pattern (and fun) airplane. With two guys flying the same airplane all day, I used to get very nervous about them running out of batteries. Now that they have a fast charger, no more worries.

Bridi Hobby Enterprises will market a fast charger that is in the same size box as the E.S.V. battery tester we talked about a couple of months ago. These units could be mounted in your field box and wired together with one cable to your transmitter and one to your airborne battery. A switch could then let you test the batteries and if they need it, flip the switch, and you're fast charging. Figure 3 is a photo of the Bridi Fast Charger.

Whether you build or buy a fast charger, get to know how it behaves with your batteries. Cycle them a few times and prove to youself it really works. Figure 4 is a plot

of charger current vs. time at various temperatures. Yours should look similar. Notice that it takes longer to charge at low temperature because the average current is lower.

I'm sure there will be plenty of questions and confusion, and a certain number of guys will destroy some batteries. If this article doesn't make sense to you, forget it. If it sounds like it has possibilities, try it. You'll like it. □

FROM THE SHOP

from page 2

publications have recently failed. I don't think the modeling public is clamoring for the three new publications, let alone yours.

Let's say though, that in the next few months we are treated to eight model aircraft publications. Here is what I see happening:

(1) Subscription sales will fall off for the existing magazines. Sales for the new ones will not meet forecasts, the reason being that modelers will pick and choose those issues that interest them rather than subscribe to all. Blessed are those magazines that consistently appeal to the largest audience for they shall be known as survivors to which advertisers and contributors will flock. If the AMA's magazine is not one of the chosen, a lot of money will have been wasted, not to mention the loss of potential new members through lack of exposure.

What about advertisers and contributors? Let's take advertisers first. If I were an advertiser, would I:

(a) Put smaller ads in more magazines?

(b) Put larger ads in fewer magazines and hope I picked winners?

(c) Put smaller ads in fewer magazines, pulling in my horns, as it were?

(d) Put the same ads that I now buy in all the magazines?

Answer: I don't know. (a) could hurt me because my competition might choose "b" and pick the winners. (b) could hurt me if I didn't pick right or if that month's issue of "RC Flying Model News" didn't sell. (c) has the same pitfalls as "b" and "a" except my advertising budget would be reduced. (d) would raise my advertising cost and I'd have to raise prices in a period that has seen more than enough price increases.

I seriously doubt that you can publish an 80 page (your figure) competitive (for readership) magazine without advertising revenue.

The other magazines are privately financed by people who have been informed of the risks and have chosen to take them. It seems that the council has decided to put the membership into the publishing business. You, sir, should go back three steps because you forgot to say "May I?"

I, and many others, remember "Model Aviation" when AMA was in the RED, and, if we think about it, WHY "Model Aviation" was DISCONTINUED.

You forgot to ask us, sir, if we would like to go into the magazine business with you. I, for one, don't want to. Hell, I don't even know you!

Considering the financial state the country is in, go back six giant steps.

But I digress. Let's go back to contributors.

I see competition for contributors. Other magazines do pay for articles, you know. It will take more than 40 articles per month, and those are just the ones accepted for publication, to feed the appetite of eight magazines.

The price for articles will go up (not bad for the contributor), the price of advertising will go up to cover the cost of articles, the price for model supplies will go up to cover the advertising. Ultimately, this will be bad for the reader and the contributor.

You mentioned at the meeting that you signed up many new members at the WRAMS show and they were highly enthusiastic about the new magazine. Sir, it is presumptuous, to say the least, to use the opinion of a one minute member as a sign that you did the right thing.

I was told by John Byrne that due to the demise of American Aircraft Modeler, something had to be done quickly. I submit that only stopping heavy bleeding and starting artificial respiration need be done quickly.

A question should be asked somewhere along here. Will the other magazines continue to support AMA by donating space to promote AMA? The answer, sadly, is probably yes. Sadly, because they are being had. They know that they need the AMA as much as the AMA needs them. The council also knows this.

Another question: What was the big hurry? Interim measures could have been taken such as, combine the monthly mailing and competition news until such time as all concerned could be notified, polled, and an intelligent decision made.

An offer was made by Model Builder to service the remaining subscription for the balance of the year. While this step would naturally be all good for Model Builder, especially if it carried the AMA news section for the full balance of the year, it would at least provide continuity for an interim period. This offer, as I understand it, was not even discussed at the February council meeting.

In view of the council's apparent disregard for the member's opinion on important issues, I hope there is a "name the Magazine" contest for this new publication. I would like to submit "The Canard" as having the right touch. It's short, catchy, aeronautical, and appropriate.

Criticism is valueless without constructive suggestions. I submit:

(a) Get out of the magazine business and leave it to those who know what they are doing and pay for the risk.

(b) Take Model Builder up on their kind offer to pick up the remaining subscription as an interim measure.

(c) Combine the monthly mailing and the Competition News. It saves on postage.

(d) In the future, make members aware of an issue before the fact, stating both pros and cons.

(e) All of the above.

Respectfully,
David Meier
AMA #5555

The next letter is a response from Gil Horstman, well known in scale, pylon racing and sailplane circles, and is an answer to Murry Frank, who responded to an original letter of protest from Gil Horstman to the AMA President, John Clemens. The letter was forwarded to the entire Executive Council and to the various model aviation publications:

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FROM THE SHOP

from page 138/2

Dear Murry:

Thank you for your answer to my memo to John Clemens but I don't think you really understood what I had to say. Possibly no one else did either because you are the only one who has taken time to answer the memo.

Murry, I would have thought that to compete with private enterprise, for advertising dollars by a dues supported organization that has been supported by the same private enterprise "must be poor business thinking AND more importantly a conflict of interest." If you read that over a couple of times you should read in several objections. Just in case you need a picture though — in the recent past A.A.M., Sport Modeler and two other magazines went bankrupt. I don't know their reasons for failure but if folks that are in the business fail, how can a group of well intentioned volunteers put together an AMA magazine that will be a financial success? I would like to know how you and AMA intend to provide funds to support this magazine, I have a feeling that advertisers will be very scarce. Do you plan a loan? Or an assessment of the membership? Or will you simply BANKRUPT AMA?

The magazine could be the first of several AMA ventures, if somehow the magazine would succeed — such as "AMA Model Works" where kits would be produced — where radios might be produced — all of which are in direct competition with private enterprise. You probably haven't thought that

far ahead but it could happen — couldn't it? With 14 people, 12 of which are volunteers, guiding 50,000 + members dues, it's obvious that ANYTHING can happen.

If AMA was not the GOVERNING body of model aviation in the U.S. and membership WAS NOT MANDATORY, I would not object to what AMA decided to do. But, I DO HAVE to pay my dues to compete in modeling activities. I would rather see my dues spent on administering model aviation programs, improving P.R. or the NATS or ?? I'm sure we can think of a lot of better places to put the money besides into an AMA magazine.

As for my solution, I hadn't seen a real problem until you folks decided YOU needed another magazine. I subscribe to all the popular model magazines and the competition newsletter and then the AMA Monthly Mailing came out. I supported the idea and, in fact, I remember talking with Alex Chisholm about getting an AMA mailing to everyone over TWO YEARS ago when the A.A.M. deal became such an issue. I feel that an AMA "Monthly Mailing" and an AMA "Competition Newsletter" are more than sufficient when read with currently published journals.

Murry, you suggest that "I try it once, I might like it." Well, I'm not sure I'm willing to be "force fed" 80 + pages of "AMA News" that could compromise the GOVERNING BODY of model aviation. It seems too high a price to pay for an "ego trip."

Yours,
Gil Horstman
AMA #374

Here's another letter concerning the AMA's new publishing venture:

Dear Mr. Dewey,

As you undoubtably know, John Worth is under contract to the Executive Committee.

I'm told it took two hours for the Executive Council, sitting as the Nominating Committee at the NATS, to decide whether or not to let Al Rabe run for President. John Clemens was unopposed and they figured Al would get only a negligible vote anyway, so they let him run.

This shook up John Worth a little, and at the next Executive Council meeting he made a proposal, which was adopted by the Council and is to be submitted to the Leader members for vote, to require only Executive Council members and those DIRECTLY appointed by them, and the incumbent, run for President.

In other words, they told Al Rabe, after he got 40% of the vote, that he was no longer eligible!

Also, John Worth made a proposal that an Executive Council committee be formed, (which has Alex Chisolm as Chairman), to further tighten the requirements for running for the Executive Council.

I understand the proposal is that only those nominated by the nominating will be eligible to run. That would mean that there would be no way to remove the incumbent from office if he chose to run. He would merely ask some friend of his to run with him, the Nominating Committee would nominate the both of them, and no one else could appear on the ballot, even as a write in candidate!

If that goes through, John Worth will have absolute dictator power and there would be no possibility of removing him.

At the present time, I don't see it as a big problem of taking control of the AMA by electing a majority to the Council. It would

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take just three years. In the NSRCA alone I would think there are enough nationally known people that could unseat the incumbent District VP. Dr. Brooke, possibly in the northwest, Don Lowe in Ohio, Ron Chidgey or Rhett Miller, Jr. in Florida, and a number of people here; you, Joe Bridi, Phil Kraft, to name a few.

I am sure John Worth is aware of this, hence the tightening of the By-Laws.

I think we should consider running a slate of candidates across the U.S. and taking control of the AMA, lock, stock and barrel. I wonder how that would go over with John Worth.

Sincerely,
Bill Simpson

I am truly sorry that this newest controversy over the Academy of Model Aeronautics has had to be aired at all. There is enough bad news in today's newspapers, television newscasts, and in the general economy, without having to have politics become entangled with a great sport and hobby such as ours. However, it is absolutely mandatory that the governing body for this sport be an effective one — one that represents the majority of its members — and that is truly "of, by, and for" the general membership. This recent action by the Academy is without precedent, and definitely without the sanction or the interest of the general membership in mind. We feel that it is a highly dictatorial move, and one that could eventually spell disaster for the organization that supposedly represents 50,000 plus members. With the recent bankruptcy of American Aircraft Modeler, we recall pointing out just a few years ago the possibilities of what could happen with the Academy affiliating itself with a commercial enterprise. Now, at an even more drastic and severe course of action, there just may be no organization around in the future to which we can say "we told you so."

I hope you have read the letters in this column, as well as our editorial stand, and those of the other publications carefully — look deeply into the implications of the recent Academy move, and see just what direction that could lead us. To say that there is virtually uniform opposal to this action by the model press and the majority of the model aviation industry would be the understatement of the year. The Executive Director of the Academy stated that this course of action was irrevocable and that there were no alternatives — we sincerely hope that this is not the case. For if it is, we have truly jumped from the frying pan into the fire, and we're going to have trouble not getting burned. □